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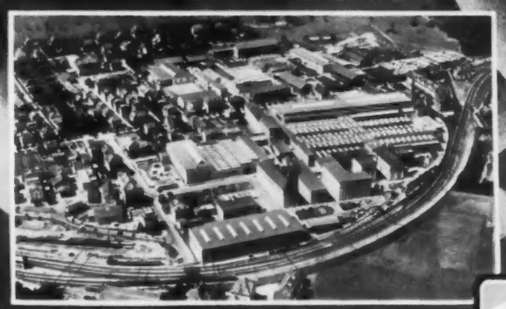

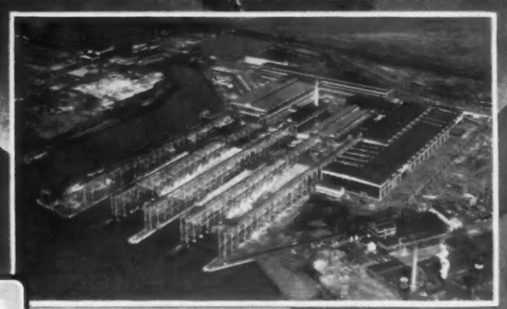

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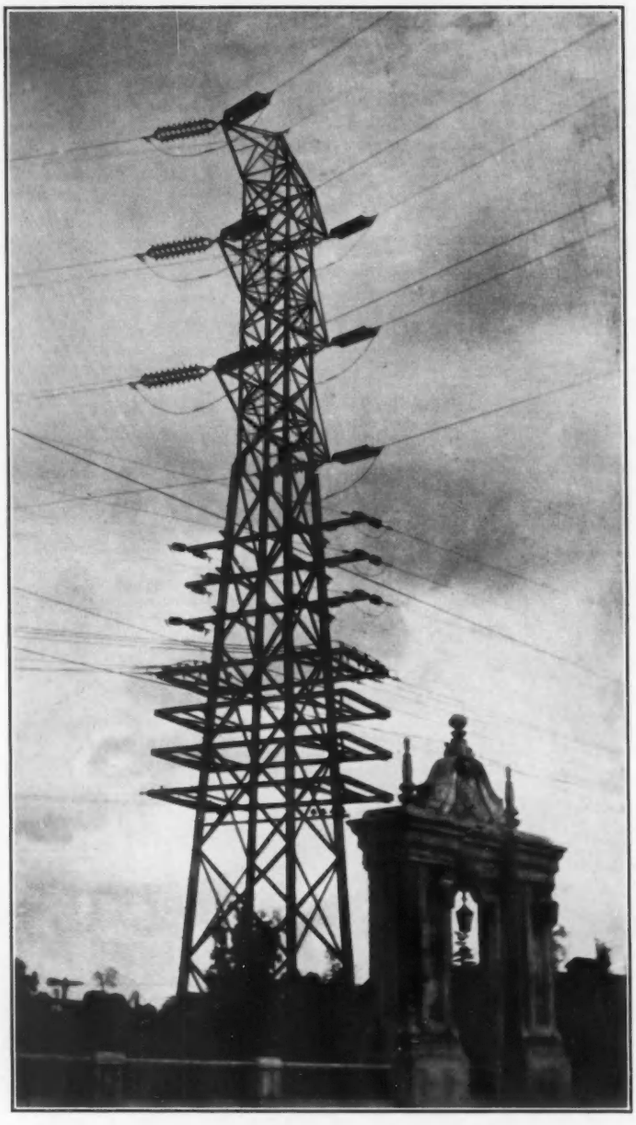

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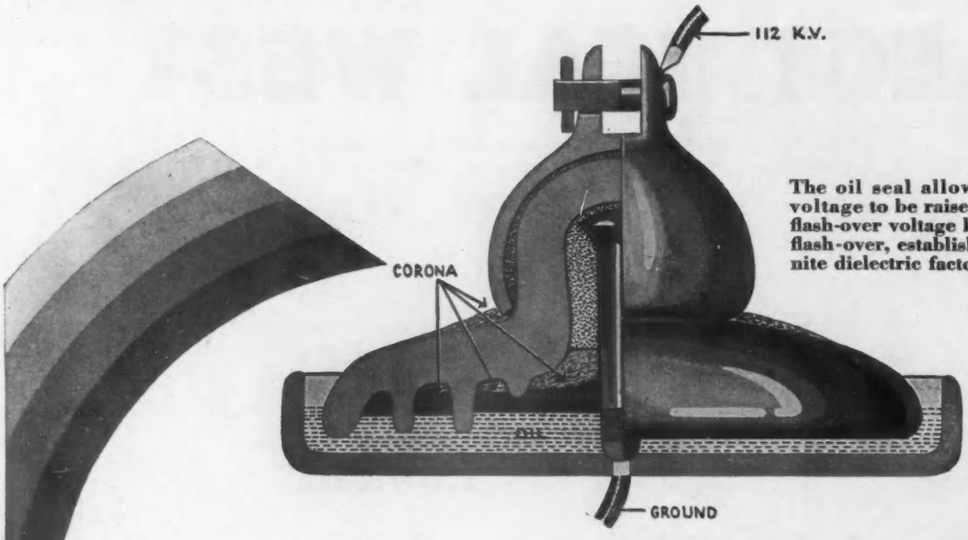

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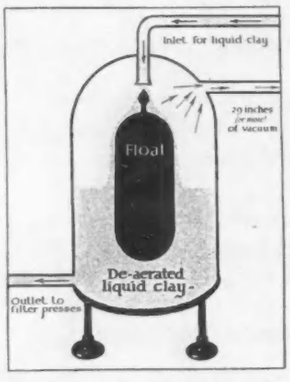

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ELECTRICAL WEST

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G. C. TENNEY, *Editor*

The Month

RAINFALL is always an interesting topic at this season. Every year, at this time, eyes turn to La Jolla Oceanographical Station for a clue as to the coming winter's weather—since wetness then means hydro capacity next year. The scientists there make hints but refuse to commit themselves as prophets pending further study of the complex relationships between wind, sea water and temperatures, tides, and precipitation. *(Page 112.)*

▼ ▼ ▼

LIGHTING has brought the whole West out of doors these nights. Baseball finds a wider patronage. Golf can now be played by more people and other sports are just discovering new possibilities in lighted, after-working-hours play. *(Page 126.)*

▼ ▼ ▼

REGULATION sometimes appears to hobble commercial advancement, but analyzed carefully it is found that both the commercial man and regulatory commission have the same interests in common. *(Page 116.)*

▼ ▼ ▼

RED TAPE is to be avoided. Paradoxically, the best way to eliminate detail is to use a well designed routine of detail handling. The electrical inspectors have made a great stride toward simplicity, and yet have preserved completeness of necessary detail in their selection of standard record forms and procedure. No matter how well organized, any city building department can profit from this work. *(Page 122.)*

IRRIGATION load used to mean the combined load from numerous individual pumping plants. In West Stanislaus Irrigation District, the power, which comes from falling water of private plants many miles away, is put to use to lift water to various levels for mass distribution. *(Page 130.)*

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POWER FACTOR consciousness came of a sudden with new power schedules in California. An engineer has inquired into the economics of installing extensive corrective equipment and presents his findings in this issue. *(Page 132.)*

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STEAM and hydro still hold the engineering debating platform. There is a definite procedure for determining how much of either must be built to preserve an economic system balance. A foremost student of the subject presents his method for the benefit of others facing the problem. *(Page 136.)*

Editorial

Kids, Cats, Kites, and Aerials

SCARCELY a day goes by without a news despatch from a Pacific Coast city concerning a death or serious injury resulting from ignorance of the nature of power lines. Either a child with a wire kite-string, someone climbing a pole to rescue the family tabby cat, a radio amateur setting an aerial, or a farmer moving a hay derrick comes in contact with an electric wire, and tragedy spreads over a community needlessly.

What better public relations than the prevention of these tragedies through education? Particularly in rural areas should utility advertising be thoughtfully directed toward properly educating consumers and consumers' families and friends, without frightening them. Good work has been done, to be sure, but a more consistent and aggressive policy is greatly needed.

A Trend in Regulation Evidenced in Portland Case

IN THE rate reduction ordered for residential and commercial lighting customers of the Pacific Northwest Public Service Company, Portland, in which the smallest users in both classifications, comprising about 75 per cent of all the company customers, are given the largest proportionate reductions, the effect of a very dominant influence on rate making is noted—the loud clamor of an uninformed public for parity with other communities in the top step of the rate. It is well known that municipalities in the power business have found it expedient to adopt rates favoring the small user—rates with a not too scientific structure, having a low top step and lacking, in a measure, the promotional characteristic that tends to build high load factor. Such rates may be termed political and the existence of them in Pacific Coast cities having municipal power systems appears plainly to have had its effect on the new Portland rates ordered by the commission.

For instance, the new rates provide for the 5½-cent top step of Seattle, and other readjustments have been included so that no customer's bill will be increased. It is interesting to note that the application of the Seattle rate in Portland would increase a number of Portland customers' bills but undoubtedly the erroneous but wide-spread belief in Portland that Seattle customers had an advantage because of their lower top step, was a major consideration of the commission in its apparent desire to make what it believed was a necessary rate readjustment in Portland that would satisfy the community.

Unquestionably, competition between communities and the comparatively unscientific political rates in existence on the Pacific Coast will be factors in future rate making, whether by regulatory commissions or private companies themselves. Conditions would be corrected if the municipal systems were placed under commission regulation. There is faint hope for such a step, however, until the great mass of voters turns against the professional politician and his persuasive arguments.

High Power Factor for Luminous Vapor Signs

OF PARTICULAR significance to the electrical utility and to the electrical sign manufacturer is an agreement between these groups in the Portland area to the effect that beginning immediately all luminous vapor signs placed in service shall be provided with power factor corrective equipment. Studies conducted by utility engineers have revealed conclusively that the increasing number of these signs has resulted in an appreciable drop in distribution power factor.

With an understanding of the facts and the assurance that capacitor equipment capable of providing correction is available, the sign manufacturers have shown their willingness to co-operate with the power companies in furnishing nothing but high-power-factor signs in the future. Addition of corrective apparatus will add but two or three per cent to the installed cost of the sign. Thus one of the principal objections of the utilities to gaseous tube signs has been removed. The Portland plan warrants extension to other cities.

Residential Load-Building Proves Its Value

TWO ELECTRIC service companies in the Pacific Northwest serving heavy industrial loads have vindicated decisively their belief that residential load is well worth the continued and determined effort required to build it. Despite a decrease in industrial consumption as compared with a corresponding period last year, the total daily power output of these systems shows a satisfactory increase during the current season. Gross revenue has increased correspondingly. The answer to the present situation lies in the aggressive merchandising policy pursued by the companies in question. Educational and sales efforts, coupled with attractive promotional rates, have brought about a combined saturation of almost 50 per cent on such heavy-duty domestic appliances as ranges, water heaters, and refrigerators. Now results are speaking for themselves in the form of increased system consumption and revenue during a slack industrial period.

What some have done, others can do with the necessary amount of diligent and well-directed effort. The experience of the Northwest companies proves that the returns are worth the investment.

Utility-Dealer Controversy— An Opportunity for Leadership

TO AN impartial observer, the present utility-dealer controversy appears to be a milestone on the road to a quicker and more complete understanding of the electrical industry's sales problem. Instead of being a stumbling block in the path of harmonious progress, it has focused attention upon a weak link in the chain of distribution of electrical appliances, and it has directed the thinking of the industry along constructive lines.

What if the tactics employed in achieving this much progress have not been above reproach? The history of diplomacy reveals that out of the heat of bitterest argument, of charges and countercharges, there frequently develops the most equitable, logical, and impartial compact.

As one commentator has summed up the present untenable situation, the utility is vitally interested in building load and the dealer equally interested in a profitable appliance business. In this respect the interests of both utility and dealer are entirely parallel. It is in achieving these ends that discord and disharmony have developed. The problem, then, resolves itself into the task of establishing a community of interest and a common understanding in the method to be employed to secure more load for the utilities and more profit for the retailers.

The solution of this problem is not fraught with the difficulties that some believe to exist. There are only a few simple fundamentals to be kept in mind.

In the first place neither impatience, vilification, nor imprecations will hasten the solution. Sincerity of purpose, honesty, patience, and consideration will.

Concessions must be made by both parties to the argument. This is true of every diplomatic undertaking.

The power companies cannot and will not suspend their load-building activities. Extension of service and healthy growth depend upon the leadership the central station exerts in building load. This is a premise that the retailers will admit.

The interests of the consumer must be considered and guarded. The power companies have a moral obligation to provide the consumer with the maximum amount of electrical service that he can use profitably and conveniently. Only then will the consumer benefit.

The willingness of the retailers to assume as large a portion of the burden of supplying the consumer with the appliances that make enjoyment of electrical service possible is something that the power companies should welcome and commend.

Furthermore, it should be recognized that the contractor is as vitally interested in the provision of adequate wiring in a home as is the central station. To the latter, an adequate wiring installation provides an avenue for fuller distribution of energy. To the contractor, it means a larger and better installation, more work and, consequently, more profit.

Finally, the best minds of the industry are concentrated upon the subject. An impartial committee representing the conflicting interests is engaged in the preparation of a report to the California Co-ordination Committee. Progress is being made.

ELECTRICAL WEST is confident that out of this present controversy there will be propounded and placed into execution a plan, program, policy, and creed that will bring harmony and understanding. If such is the case, then the Pacific Coast will have contributed to the national progress of the electrical industry in the same measure that it did when the original idea of co-operation between all branches of the industry was developed here in 1917.

The Industry

Long-Range Weather Forecasting

The popular cry is for weather forecasts weeks, months, or even seasons in advance to enable many directly affected activities to be adjusted accordingly. An outline is given here of some methods of forecasting Pacific Coast weather in general and California weather in particular

By A. F. GORTON

Associate in Meteorology, The Scripps Institution of Oceanography of the University of California, La Jolla, California

INVESTIGATIONS pertaining to long-range weather forecasting now in progress at the Scripps Institution of Oceanography of the University of California are the outgrowth of a program of researches in dynamical oceanography begun about sixteen years ago by Dr. George F. McEwen, originally physicist and now professor of physical oceanography at the Institution. In the course of investigating current velocities as related to temperature and salinity in the portion of the Pacific Ocean off the coast of southern California, observations were made of surface temperatures at La Jolla as well as at inshore stations farther north. A study of these records led to the conclusion that a relation existed between water temperatures during the summer and the precipitation of the succeeding winter season over the adjacent land areas.

Agreement of temperature and rainfall departures from 1916 to 1922 was so gratifying (practically 100 per cent) that Dr. McEwen was encouraged to issue a tentative forecast in October of each year beginning with 1923. In the spring of 1928, Dr. T. Wayland Vaughan, director of the Institution, and Dr. McEwen laid before the Economic Council in Los Angeles a program for a concerted attack on the forecasting problem, to include studies of evaporation and the penetration of solar radiation into sea water as well as of the usually recorded meteorological elements (temperature, pressure, and precipitation) and the characteristics of the seasonal cyclonic storms.

Inauguration of this program was made possible by the financial support of interested individuals, the Los Angeles Bureau of Power and Light, and several public utilities. Of the latter, the most directly concerned are the large gas and electric power companies, some of which have been devoting considerable effort to formulating forecasting systems suited to their own needs. With a foreknowledge, the electric companies have a

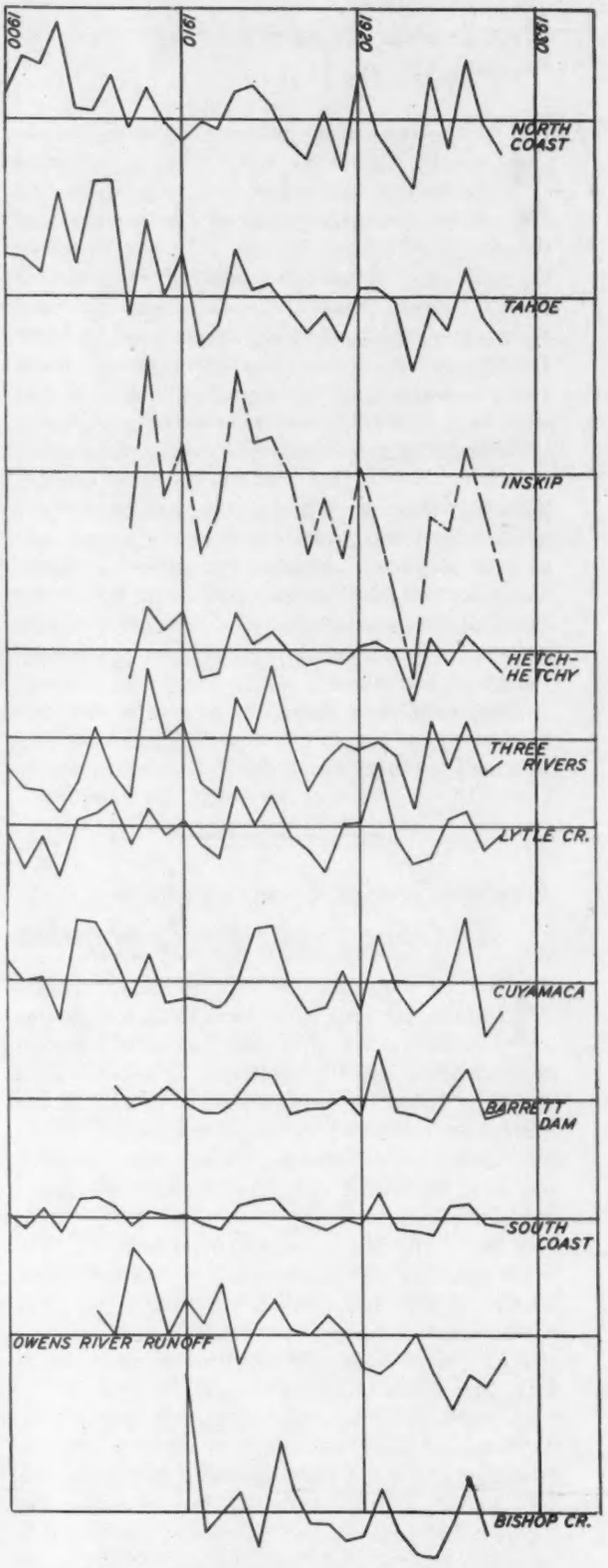


Fig. 1. Similarities in trend of seasonal precipitation at points in northern and southern California, with individual differences due to excursions of storm tracks, may be seen in these composite curves. Each is the average of from two to seven stations

basis of planning economical load division between steam and hydro plants and the gas companies can plan to meet more definite winter demands. Thus a forecasting system should provide estimates of winter temperatures as well as of seasonal percipitation.

Methods of Forecasting

Attempts to predict the nature of the weather by as much as from one week to one season in advance fall into two general classes. One class involves recurrences of some sort (often ascribable to astronomical culminations, or extra-terrestrial causes). The other class is based upon variations in the terrestrial elements (temperature, pressure, wind, and precipitation) or in the solar characteristics observed during the preceding month, season, or year.

The former method is suited chiefly to the prediction of weather anomalies on a long-period basis, for it is recognized that variations from the annual (seasonal) temperature and precipitation occur over intervals of 11, 22-35, 55, 70-90 and possibly 160 years, but cycles of less than 11 years are not well established. The latter may be termed a *dynamical* method, in the sense that a physical basis of cause and effect underlies the factors of the numerical correlation. Usually the connecting link is *pressure*, or pressure difference, set up by the seasonal warming or cooling of the continental areas, but in many cases it must be admitted that the relation of cause to effect is quite obscure. Thus, a recent correlation between Winnipeg winter temperature and conditions in India during the preceding ten months involves apparently an interchange of air between the continents. However, there is a lack of direct observations which would make such an interaction plausible.

Perhaps the best known of the dynamical systems is that of the Indian Weather Service. The correlation in this case expresses the dependence of rainfall in India upon the seasonal warming of Siberia and the northward movement of air over the Indian Ocean. Records available (from 1875) show that such forecasts on the average have been correct three-fourths of the time. Other records show a coincidence, at intervals of 6-7 years, of drought in Java with heavy rains on the coast of northern Peru.

"Solar" systems are based upon observed variations in the spottedness of the sun, or upon changes in the value of the solar constant itself. As interpreted by different forecasters, such changes permit of predictions from one week to one month in advance, and apply to the intensity of individual storms or to daily temperature departures. It is difficult to gage the success of these forecasts, partly owing to the generality (as to time, etc.) of the predicted events.

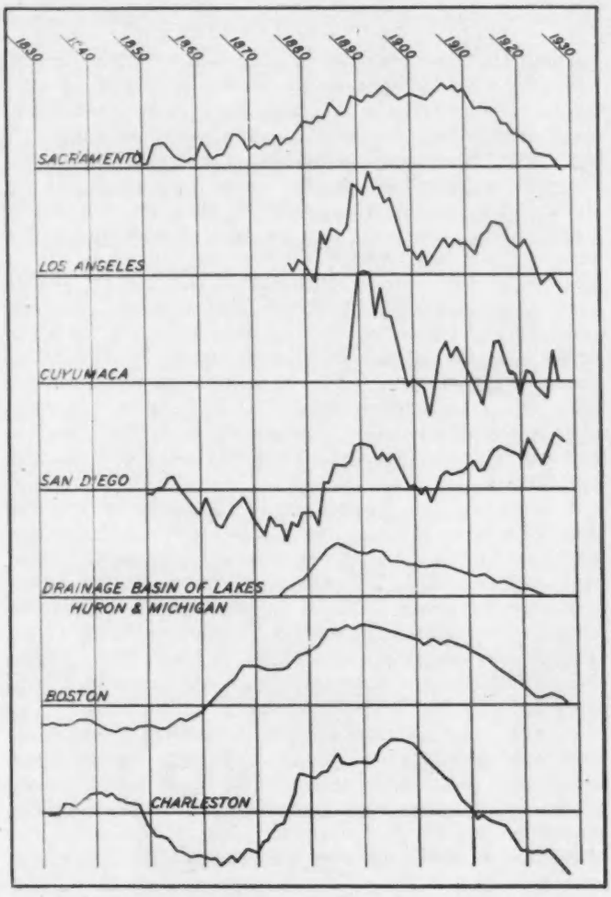


Fig. 2. Accumulated departures from normal precipitation at various stations

Influences on California Precipitation

Precipitation of the United States and Canada is mainly the product of cyclonic storms which travel from west to east in more or less well defined tracks starting from the region of the Aleutian Islands, diverging over the land areas and converging again over the northern Gulf Stream. These storms enter the Pacific Coast for the most part north of California, in fact even north of the Columbia River. Occasionally the track lies farther south, and the storm enters California at the northwestern tip, giving rain to almost all regions except possibly the south coast and Imperial Valley. Such storms are known as "general" storms. Less frequently low-pressure areas entering below Point Conception yield heavy rainfall over southern California, particularly the higher elevations. These are termed "southern" storms.

A survey of stations having long records shows that differences exist between the seasonal precipitation of the various regions in California, partly because of topography and partly because of variations in the storm paths. In the south (Fig. 1), wet years come at intervals of 11 or 6 years, with dry periods in between. Farther north, the variation seems to consist of a two-year alternation superimposed on a broader (secular) general downward trend of rainfall in the last 30 years, a trend also shown by precipitation in other parts of the country, such as Oregon, Great Lakes basin, and south Atlantic Coast.

Inshore Surface Temperature as a Forecasting Index

While the climate of the Pacific Coast is influenced the whole year through by the thermal content of the nearby water, it is in summer that the effect is the most striking. Fog and cold water go hand in hand from Puget Sound to San Diego. The best known case, of course, is the Bay of San Francisco.

North of Cape Mendocino the water is normally cold due to the drift from higher latitudes. At and below Mendocino, owing to the southeastward trend of the coast line, upwelling of cold water from the depths of the ocean is the chief factor. This upwelling depends upon the direction and force of the winds or, in other words, upon the intensity and stability of the north Pacific high-pressure area. Below Point Conception (Santa

Barbara) the coast trends still farther to the east and in that region the upwelling is less pronounced.

Surface temperatures at south coast stations such as La Jolla, therefore, will exhibit departures from what would be normal temperature for the latitude in question. This effect is more marked in summer. High temperatures at La Jolla, therefore, may be taken as an expression of the comparative absence of upwelling and a weak development of the high-pressure area, whereas low temperatures go with marked upwelling and a strong, rather fixed high. To what extent this is an indication of surface temperatures over a wider area of the ocean—in particular, the triangle defined by Dutch Harbor on the north, San Francisco on the east, and Honolulu on the west—it is difficult to say. Records of various merchant ships show that, at least in a few years, surface temperatures and barometer readings over the above area are in logical accord with upwelling as deduced from inshore temperatures.

Table I shows the record of surface temperatures taken at the Scripps Institution's pier, La Jolla, since the beginning of such observations in 1916. Opposition in the sign of the departures is noticeable, particularly during the period 1916-1923 which was a dry period, on the whole, for the south coast. Correlation coefficient between pier temperatures and south coast rainfall as calculated from these data are as follows:

1916-1924 coefficient = —0.54
1916-1929 coefficient = —0.51

Though these coefficients are comparatively high, the number of years covered by the observations is small and we cannot be sure that the correlation will apply as well during the next ten years as it did during the first decade.

The hypothesis on which the correlation rests is that a given abnormality of the surface water (high or low temperature in response to the influence of the summer high) will persist for another three or even six months. In brief, if the water be previously *cold*, stability of the high during the summer will tend to reinforce this state. Correspondingly, if the water be previously *warmer* than normal, a weak development of the high will tend to preserve this kind of temperature departure.

TABLE I—Record data showing relation between surface temperatures at La Jolla, Calif., for the period Aug. 1 to Oct. 15 each summer and the rainfall on the south coast from Los Angeles to San Diego.

Year	Temp.	Rain	Departure From 13-yr. Mean Temp.	Rain
1916	66.4	12.9	-1.0	-0.3
1917	68.8	10.9	1.4	-2.3
1918	69.3	8.9	1.9	-4.3
1919	66.7	12.3	-0.7	-0.9
1920	67.8	10.8	0.4	-2.4
1921	66.4	21.6	-1.0	8.4
1922	67.8	9.0	0.4	-4.2
1923	69.5	8.7	2.1	-4.5
1924	65.5	7.6	-1.9	-5.6
1925	66.9	16.8	-0.5	3.6
1926	67.4	17.8	0.0	4.6
1927	67.4	11.1	0.0	-2.1
1028	66.0	10.2	-1.4	-3.0
1929	69.1	(9.2)*	1.7	(-4.0)*
13-yr. mean	67.4			

* Indicated.

According to Sir Frederic Stupart, the intensity of cyclonic development in the Dutch Harbor area during the winter depends upon the degree of warming of the ocean adjacent to the colder land. In other words, the warmer the water the more intense the storms; colder water should be linked with a weaker development of the cyclone. Moreover, he believes that the character of the winters in western Canada can be traced to the thermal condition of the surface waters of the Alaskan Gulf. Thus, 1925-26 was marked by warm water and a warm fall in south Alaska, with an exceptionally warm winter in the Canadian Northwest. In such years there is a tendency for the storms to move inland at high latitudes (above Puget Sound) and as a result the pressure over western Canada is lower than normal. A further result is that the anticyclones push to the east of their regular track, and affect Quebec and Labrador with a simultaneous strengthening of lows over the North Atlantic. Thus, summer water temeratures in the Northeast Pacific may be linked with the weather over the North Atlantic during the fall and winter.

All of these ideas are more or less consistent with the Bjerknes hypothesis of the Polar Front*, provided we assume that the presence of *cold* water in the Northeast Pacific will operate to draw the overlying cold (polar) air farther south, and, *vice versa*, that *warm* water will induce the polar front to move farther north. Applying this theory to California rainfall, we have a dynamic explanation for the manner in which the La Jolla index has been interpreted, that is, that warm water along the coast should be followed by a dry winter, and cold water during the summer should presage a wet season. However attractive this theory may seem, it must be admitted that observations sufficient to justify such a thermal interaction between the ocean and the atmosphere above it have never been made. Furthermore, while inspection of the available data on surface temperatures (Tables I and II) affords a strong presumption that the relation holds for a limited number of years, it is by no means certain that it is valid indefinitely.

TABLE II—Record data showing departures from the normal of surface temperatures in the Gulf of Alaska according to the Kobe reports.

Year	Winter Jan.-Mar.	Spring	Summer July-Sept.	Fall
1916	—	—	—	—
1917	+	+	+	+
1918	+	+	+	—
1919	—	—	—	+
1920	+	+	+	—
1921	(data for 1921 not yet published)			
1922	+	+	+	+
1923	+	+	+	—
1924	+	+	—	—
1925	—	—	+	+
1926	+	+	+	+

It is known that the location of the center of pressure over Siberia exerts a controlling influence on the waters adjacent to the Japanese archipelago and from this it was deduced that Tokyo temperatures should reflect ocean temperatures. Efforts to use Tokyo temperatures as an index upon which to base sequent Pacific Coast precipitation are not encouraging on the whole in spite of the fact that there seems to be a semblance of a relationship with Hetch Hetchy rainfall. (Table III.)

Several indices tentatively put forward in recent years are based upon the thought that a definite weather trend established early in the season will persist until the close of the season, or at least for sufficient time to stamp the season as wet or dry, warm or cold. While certain of these have held good over certain periods, they have

* The Polar Front is the border between the cold, dry air of polar origin and the warm, moist air of tropical origin. It is along this line that the cyclones (storms) of the Temperate Zone arise.

definitely failed several times during the past twelve years. (See Table III.)

SUMMARY

Analysis of the precipitation of the more important districts of California reveals variations ascribable to differences in topography and to variations in the paths of the seasonal storms. Cycles of recurrences of 2-3 years, 5-6 years, and 11 years are apparent from the graphs for both northern and southern California, these being superimposed upon a longer or secular cycle of approximately 50 or 60 years. Some connection with solar phenomena is possibly indicated by the fact that the sunspot maxima of 1870, 1893, and 1917 mark the beginnings of dry periods of as much as six years' duration.

Forecasts of the wetness or dryness of extended periods of, say, six to eleven years would seem to be almost as important to certain interests as predictions of the seasonal precipitation. The problem of supplying water and power to the rapidly growing cities of California and the irrigation demands of the agricultural districts have reached the stage where it is necessary to plan for the probable consumption of ten to twenty years ahead. Whether such an estimate can be made intelligently at the present time is open to dispute, but general opinion among hydraulic engineers is in agreement with conclusions based on the graphs shown, i.e., that the period 1929-1940 will be wetter than the preceding decade.

As to forecasting indices applicable to the seasonal precipitation, it would seem that the ocean temperatures taken during the summer at inshore points between Cape Mendocino and San Diego furnish on the whole a more reliable basis than observations of water temperatures or weather elements at much more distant points. The index with the highest coefficient at present is that based on a combination of surface temperatures at the inshore stations, Hueneme and La Jolla, and the ratio of the probable error to the coefficient ($\pm$ 0.06 to 0.84) is small enough to justify considerable faith in the reliability of the index. The most obvious criticism is that it rests upon such a limited observational basis. However, if our investigations reveal one or more additional factors related to subsequent seasonal rainfall and all are combined, as was done in developing the Indian forecasting system, the chances are that the resultant correlation coefficient will be greater than that for the present index.

TABLE III—Correlation coefficients of various indices with precipitation in northern and southern California.

Index	Precipitation District	Period	Correlation Coefficient
La Jolla summer temp.	South coast	1916-29	-0.51
Same for 1916-23	South coast	1916-23	-0.54
Hueneme summer temp.	South coast	1919-29	0.79
Oceanside summer temp.	South coast	1921-26	0.61
Pacific Grove sum. temp.	South coast	1919-29	0.34
Tokyo Sept.-Oct. temp.	Hetch Hetchy	1907-28	-0.44
Tokyo Nov.-Dec. temp.	Hetch Hetchy	1907-28	-0.42
Tokyo Mar.-May temp.	South coast	1900-28	-0.37
Tokyo Mar.-May temp.	Hetch Hetchy	1907-28	-0.33
Santa Barbara Nov. rainfall	Crescent City	1900-27	0.36
San Diego Sept.-Oct. rainfall	Crescent City	1900-27	-0.40
Composite index of Hueneme and La Jolla summer temp.	South coast	1919-29	-0.84

REFERENCES

Robert DeC. Ward—"Present Status of Long-Range Weather Forecasting." *Proceedings American Philosophical Society*, Vol. 65, p. 1 (1926). (A review of forecasting by method of recurrences, work of the Indian Meteorological Service in predicting Monsoon rains, ocean temperature forecasts, etc.)

Sir Gilbert Walker—"World Weather," *Monthly Weather Review*, Vol. 56, p. 167 (1928). (Summarizes status of Indian Monsoon prediction, with description of interactions involving weather elements of the two hemispheres.)

George F. McEwen—"Ocean Temperatures and Seasonal Rainfall, a Review of Their Relation Based Upon Records of the Past Nine Years in Southern California," Bull. 12 (1926), Scripps Institution of Oceanography. (Beginning of Ocean Temperature Forecasts.)

V. Bjerknes—"The Meteorology of the Temperate Zone and the General Atmospheric Circulation." *Monthly Weather Review*, Vol. 49, p. 1 (1921). (Explanation of Polar Front.)

▼ ▼ ▼

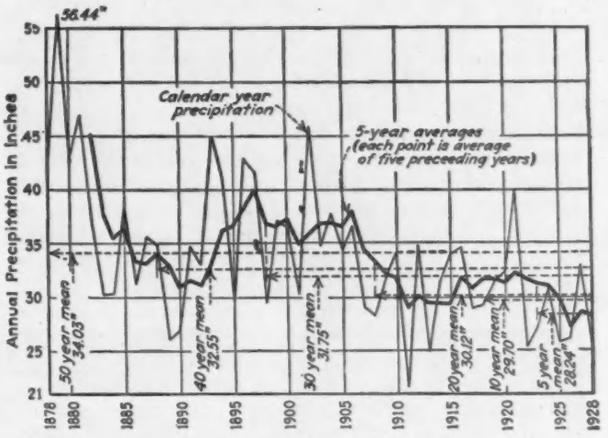
Seattle's Rainfall Problem

DOWNWARD trend of rainfall figures for the Northwest over a period of 50 years is shown in a chart prepared by W. C. Morse, consulting engineer, of Seattle. Of particular significance is his interpretation of the figures, for he says:

"The water situation in the Northwest (and, incidentally, of the Pacific Coast) is more serious than is commonly recognized. Groundwaters are much lower than any previous record, and while groundwaters do not directly govern the flow for hydro-electric use, yet they do affect the demand for power by requiring pumping against higher heads."

With the lower rainfall, the diminishing glacial flow offers one answer to the question of the trend from hydro-electric to steam-electric power generation on the Coast.

"Water for hydro-electric power (in the Northwest) is largely obtained from the winter snowfall and later from the glacial flow. The glaciers, without any exception of which I know, have receded materially in the past few years and the flow therefrom is gradually becoming less and less."



In explanation of the chart he says:

"This is a calendar-year record. Storms that come during December and January may, on occasion, combine the heaviest precipitation of two successive seasons in the record of a single calendar year, thus building very sharp peaks. To offset this I have established a five-year average built by taking the mean of the five years immediately preceding each successive year of the record; this gives a much less ragged curve. Data for the diagram include records kept privately for the years 1887 to 1890, but subsequently corrected by the U. S. Weather Bureau and used as part of its record."

Commercial

*Regulation and the Commercial Man**

By A. V. GUILLOU
Assistant Chief Engineer, California State Railroad Commission

DOES ANY connection exist between the commercial men of the power companies and the body that exercises control over those companies? Consideration of the subject will show that there is a great community of interest, and that in most things the commercial man and the regulatory body are working toward common ends.

The commercial man desires, above all things, that his company enjoy the good will of the public, because he believes that a satisfied customer is the best possible advertisement. The regulatory body is held responsible by the public for the treatment that it is accorded by the power companies, and the good will of the public toward these companies is, therefore, an evidence of the proper discharge of the regulatory duties. One of the principal duties of the commercial man is to bring about an increase in the business of his company and, by contributing to the possibility of lower rates, that increase in business smooths the path of the regulatory body. The commercial man is interested in the establishment of satisfactory schedules of rates, and the fixing of proper rates is one of the primary duties of the regulatory body. While there may be some divergence in point of view between the commercial man and the regulatory commission, they are working toward common ends and must meet common problems.

Things that cause both the regulatory commission and the commercial man the greatest amount of trouble are those that tend to lower the power companies in the estimation of the public. The public consists of a large number of individuals. It seems likely that the same standards used in judging the conduct of an individual are applied to corporations by that great group of individuals which we call "the public."

For the past ten years the commercial departments of the power companies in this state have devoted much attention to the treatment which is accorded to consumers. The results speak for themselves, because there has been a continuous decrease in the number of complaints which consumers make against the power companies. In this solicitation for the fair treatment and good will of the consumers, has the public as a whole received equal consideration? The commercial men must be missionaries and must carry into other departments of their companies the gospel of fair dealing and courtesy that they have so long practiced and preached among themselves.

In talking with your customers, you undoubtedly capitalize the fact that all of the company's patrons are charged upon uniform and non-discriminatory schedules of rates. "One price to all" may be one of the slogans of the commercial department, but how about the right-of-way department,—is it equally non-discriminatory, or does it take advantage of the company's friends and pay good prices to the company's enemies? How about local bills? Are they paid as promptly as you require your customers to pay you, or do you permit your local people and your auditing department to get into endless wrangles over requisition numbers, emergency orders, pink and blue copies of this and that, while the small local creditor waits for his money? Do those who have just claims against your company receive the same welcome in your claims department as prospective customers receive in the commercial department? How about the strange salesman who comes within your gates? Does he leave your purchasing department with a feeling that he has been justly although strictly dealt with, or does he thank a watchful Providence that he has been able to come out with his shirt and his shoes?

We judge our fellow men by their conversation as well as by their actions. What kind of conversation goes out from your publicity department? We respect the man who talks, but not too much, about what he has done, while the man who continually tells of what he is going to do falls in our estimation. If boasting runs to financial affairs, and particularly about how much money is to be spent, it is considered in very bad taste. Fortunately, the electric power industry seems to be passing out of the era of huge construction programs. There was a time when no power company could hold up its head among its fellow power companies unless it had a construction program ahead of it running into millions of dollars, and if it could only go into the hundred million dollar class, it was that much better. Apparently, some power companies felt that their construction expenditures were not large enough to entitle them to proper standing in the community because their public statements have combined construction and operating expenditures in one figure.

Another characteristic to be admired in the individual, and possibly above all others, is honesty. The man that can tell his story, whether creditable or discreditable, and face the consequences, stands far higher in our estimation than the fellow that fits his statements to the occasion, rather than to the truth. We do no think so much of the chap that can blow first hot and then cold. How do your companies measure up to this standard?

These are some of the things that tend to lower a company in the estimation of the public as distinguished from its consumers and they are, therefore, the common problems that confront both the commercial men and the regulatory body.

The subject of rates is one that, perhaps, more than any other, combines the community of interest and the diverging point of view of the regulatory body and the commercial men. As has already been said, the regulatory body looks upon the fixing of rates as one of its primary and most important functions. These rates become the power salesmen's price book and there is little that can be more important in the conduct of his work.

* Based upon a talk before the Commercial Section, Pacific Coast Electrical Association.

Valuations and court decisions may indicate, to some extent, the means of measuring the proper general level of rates, but in the construction of schedules there is nothing that can take the place of the commercial man's experience. The regulatory body is detached from the consumers; it hears from them indirectly. The commercial man is constantly on the firing line.

Much progress has been made in the last ten years in the detailed design of rate schedules and the elimination of those features that cause complaints, but much more progress still remains to be made. The regulatory bodies are alive to the situation and will not only receive but will welcome the considered suggestions of the commercial men. The commercial men have an opportunity to gather together and pass along for ultimate correction the little things that cause dissatisfied consumers. We dream of a happy day in the future when all consumers will be satisfied, but if that golden day ever dawns it will be because of common sense and co-operation, and not of high pressure salesmanship in the commercial department and legal precedent in the regulatory commission.

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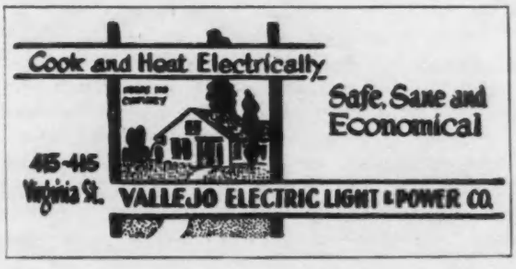
Advertising With Stickers



STICKERS similar to that above are placed on all bills of the Vallejo Electric Light & Power Company. Their use offers a cheap but effective method of advertising to the right type of prospects—present consumers.

Sign Board Becomes a Show Window

COMBINING the features of a downtown show window with the accessibility and location of an electric sign has been the success of the Public Service Company of Colorado in Denver. Probably no sign boards in Denver have attracted more favorable comment than those erected by the Denver company featuring electric refrigeration.

Spotlights, floodlights, and overhead lights illuminate the interior of a show window effect on these large boards, outside floodlights also enhancing the attractiveness of the display. In these windows are placed sizable refrigerators with background scenery to give the effect of depth.

For the first time these boards incorporate all types of commercial lighting, applied simultaneously and correctly. Billboard reflectors are used to illuminate large areas of painted sections. Neon tubing outlines the entire set and is employed for decorative effects. The Public Service Company's name is lettered in the new S 11 orange incandescent lamps. In some displays an *aurora borealis* changes color in the background by means of a flasher.

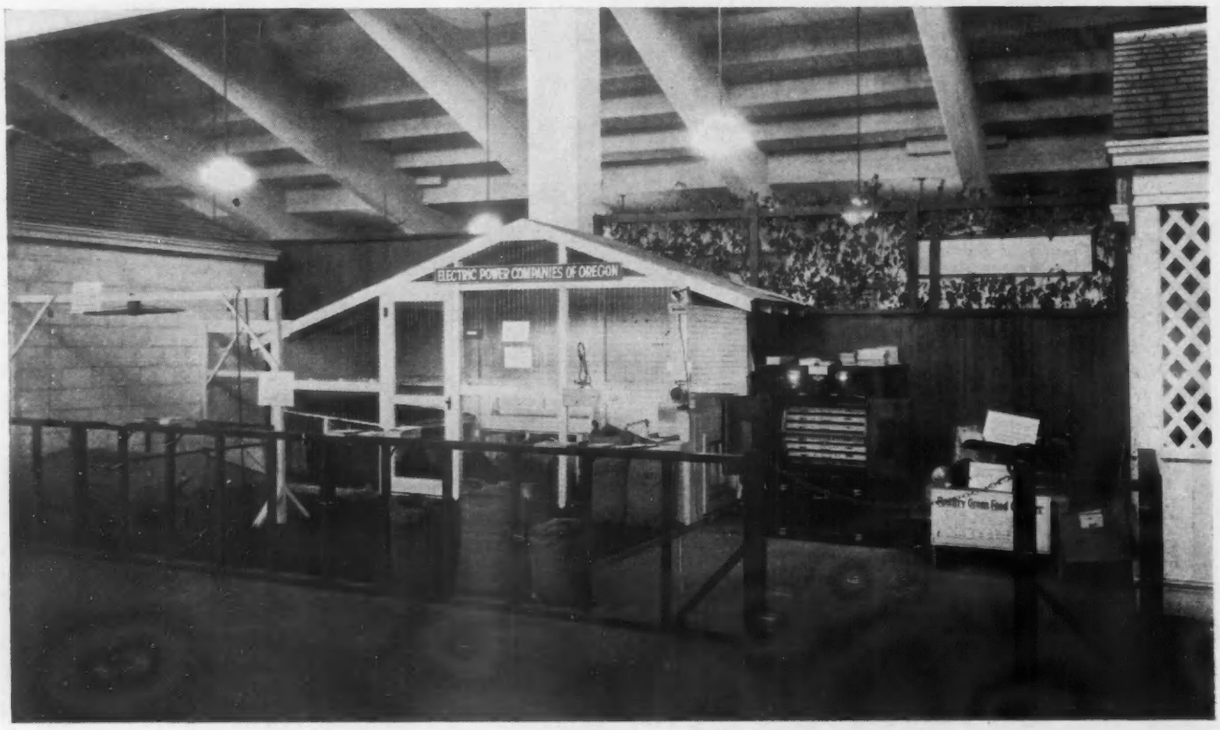
A loud speaker attached to a radio in a nearby restaurant was installed on a sign recently, illustration of which is found on this page. This sign is set on an angle on a corner in the residential district where signals stop traffic, thus allowing motorists and pedestrians a prolonged view of the display.

As a business getter, officials of the company praise the boards highly. In three weeks after the first sign was completed at least three refrigerators are known to have been sold as a direct result. Indirect results cannot be estimated. A remarkable surge of refrigeration business during recent months is attributed largely to these spectacular displays.

Attractive new outdoor displays of the Public Service Company of Colorado (Denver), in which a large show window is built, combine appeal of a window display with accessibility of a sign

Permanent Exhibit for Oregon Fair

PERMANENT equipment for exhibiting annually the uses of electricity on the farm has been erected at the Oregon State Fair grounds at Salem. The display, made possible by the action of six Oregon power companies, was first shown at the 1929 fair. The illustration above shows an electrified farm house with all electric appliances. Below is the poultry yard with electric brooder, incubator (*left*), lighted hen house with time switch for controlling the light, and green food grinder (*right*). Other features of the exhibit are a dairy with a power-driven separator, milking machine, sterilizer, and refrigerator. Outdoor equipment, including motor-driven irrigation pump, also was shown.



Bureau Campaign Placed Through Dealers

Details Worked Out on Range Installation Costs, Sales Assistance From Bureau Staff, and Other Factors for Large-Scale Results

FACED with a subnormal growth of domestic load without outside stimulii and committed to a policy of making no sale of electric appliances itself, the Los Angeles Bureau of Power and Light launched, in May, an eight months' advertising campaign designed to add 15,000 kw. of major electric appliances to its load through electrical contractors, retail range dealers, and special contact representatives of the Bureau.

Co-operative selling of appliances for the dealer by these Bureau salesmen was the basis of the project. By this means it was expected to obtain electric range installations in every section of the city of Los Angeles, with efforts directed principally to selling existing consumers of the Bureau. The quota for the $91,000 campaign was 1,500 electric ranges, 500 electric water heaters, and 300 units of electric space heating.

A PENNY PER PERSON PER MEAL
AT MUNICIPAL RATES
MODERN Fast Cooking
ELECTRIC RANGES!
AT THE LOWEST COST IN THE HISTORY OF LOS ANGELES
$10 .. INITIAL PAYMENT
and an allowance on old range
BALANCE ON CONVENIENT TERMS
BUREAU OF POWER and LIGHT DISPLAY
YOUR CITY-OWNED
BUREAU OF POWER AND LIGHT
City of Los Angeles

One of the many advertisements used by the Los Angeles Bureau of Power and Light in its $91,000 range campaign is pictured above. All range sales were made through dealers, whose names were inserted in the advertisements as indicated by the arrow

MODERN Fast Cooking
ELECTRIC RANGES
Delivered-Installed Ready to Cook-for $10 .. INITIAL PAYMENT
with an allowance on your old range!
SEE THEM INSIDE!

Among the many types of advertising used was this window sticker given to dealers. The campaign, designed to add 15,000 kw. to the Bureau's load, was handled entirely with and through contractors and dealers

Agreement of the dealer to three terms was necessary before he shared in the sales made by the eighteen salesmen which the Bureau placed in the field. First, the old gas range must be taken in as first payment ($10) on a new electric range. Second, wiring for the range must be supplied at a cost not to exceed $40. Third, financing of the sale of appliances and wiring must be on a time contract not exceeding eighteen months.

The details of the wiring were carefully worked out with the co-operation of the Los Angeles Electragists. The latter determined upon a standard wiring installation method and price, and arranged with a limited group of contractors who were equipped to concentrate upon this type of installation for the filling of the orders for wiring as they were brought in from all dealers. It is interesting, in this connection, that practically all of the active contractor-dealers who entered the campaign turned over their wiring to these specialists to be done along with that of the department stores and other merchants. At the low price of installation agreed upon, only by this specialization and large volume could the plan have worked economically.

Every type of advertising was used. Most extensive was that in daily and Sunday newspapers, 27,000,000 impressions, with accompanying publicity. For each of five months a four-page illustrated letter was mailed to 40,000 chosen home owners who were consumers on the Bureau of Power and Light lines. Radio announcements were made daily over five stations. Tire covers were designed with messages pointing to the low cost of electric cooking. Home economics classes were formed under capable demonstrators. Plentiful outside display material and miscellaneous printed matter were distributed throughout the territory.

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Now It's Aerated Waffles

WHEN waffle iron sales lag, a new idea is presented to revive them. Not long ago, when waffles were a once-a-week delicacy, and the waffle iron was relegated to the sideboard for the remaining days, came the strawberry waffle.

New, and responsible for increased sales of waffle irons, is the aerated waffle, made possible by the use of the carbonated water bottle made by Sparklets, Inc. With this bottle, which has been used to make ice cream in the electric refrigerator, the griddle of the iron can be sprayed with a batter filled with air holes, aiding the batter to rise and leaving the finished waffle a light, yet crisp, delicacy.

Salesmen can now promise customers a new waffle and a new success in waffle baking. Instead of a once-a-week delicacy, waffles can now become a daily food.

Main circus tent, showing banner over bandstand

Circus Advertising a New Wrinkle

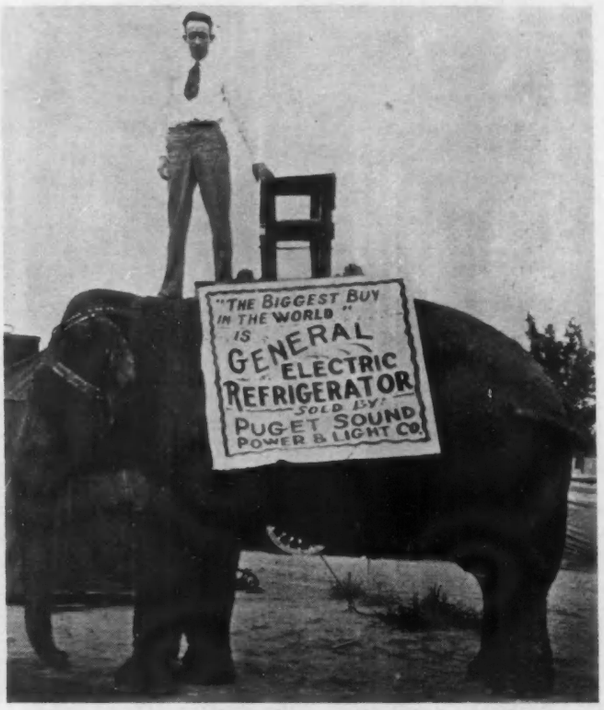
NEW WRINKLES in advertising are not easy to conceive, but the enterprising district managers of the Puget Sound Power & Light Company in the Northwest have started something. Now, whenever Al G. Barnes and his circus come into a Washington town, a General Electric refrigerator campaign is cleverly entwined with the program.

At Wenatchee, Tusco, the biggest elephant in the world, walked around the arena with a large sign proclaiming General Electric refrigerators as the "biggest buy in the world."

When the circus showed at Everett, a refrigerator was placed on display in the menagerie tent. A sign calling attention to the fact that no owner had paid one cent for service was hung over the bandstand. Tusco again made a tour of the arena with a sign. And, as a climax, the parade was stopped for a moment while one of the clowns made an announcement regarding the machine.

Patrons of the circus in Seattle and other towns saw similar displays.

Tusco, "behemoth pachyderm," supporting Harley Bryant, of the Puget Sound Power & Light Company, and a General Electric sign



When Does A Man Sell Out?

Beginning a Short Series on Some of the Legal Aspects of Doing an Electrical Business in the West

By **Ross Dudley**
Attorney, Salt Lake City

FOR the past ten years the A and B Electrical Companies had been engaged in the keenest kind of competition in a certain city. Finally A decided to retire from the electrical field and offered his establishment, including the good will, to the B Company, which promptly purchased it. As part of the consideration, A signed an agreement never to enter the electrical business while the B company was still engaged in that trade in that city.

After three years of pursuing other lines of business, A started an electrical establishment in the adjoining county. B promptly brought suit for an injunction to restrain A from engaging in the electrical business and for damages.

Can B prevent A from engaging in the electrical business under their agreement?

The general rule, as laid down by the American courts, is that such a contract is unenforceable and A can enter the electrical field despite the agreement, which is void because it prevents A from engaging in the electrical business anywhere, and constitutes an unreasonable restraint of trade. If this contract had simply prohibited A from doing electrical work in that city, as long as B was engaged in that business there, it would have been upheld. In other words, the contract must only prevent A from doing business in a territory no greater than the area used by the business that he sold.

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Visualizing A Slogan

DURING the interval when the Public Service Company of Colorado, of Denver, was undertaking a campaign to sell more electric light bulbs, and when stress was placed nationally on the thought, "Paint With Light," the window display department concocted a clever method of impressing the thought upon the people who passed the company's show windows.

A representation of a painter's pallet was cut out of wall board and painted black. Around the upper edge, where the artist usually deposits daubs of paint to be transferred to his canvas by brushes, were electric light bulbs of various colors inserted in sockets fixed to the under side of the board. Surrounding each bulb was an area of painted surface representative of the daub of paint. The daubs were of a greater variety of colors than was possible to suggest by means of colored globes alone, hence some of the globes burned white light to illuminate a green, yellow, purple, or pink spot of paint.

Pallet, with lights for colors, used in Denver "Paint With Light" campaign

Through the thumb hole in the pallet were thrust several large brushes which showed signs of having been used. Across the face of the pallet was painted in white on the black background, the slogan, "Paint With Light."

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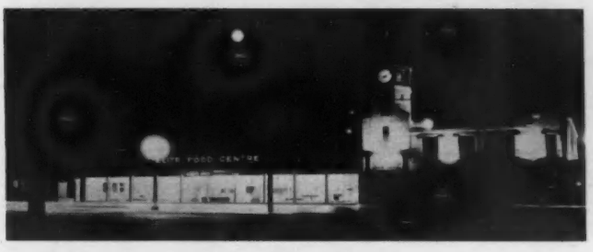
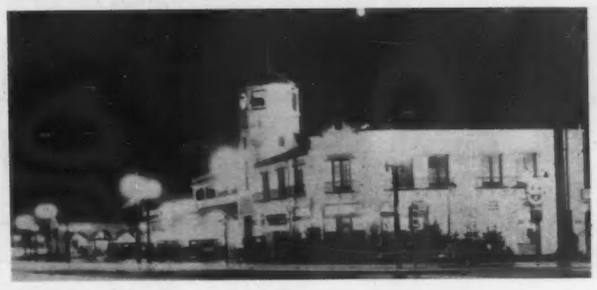
BEFORE new lights were installed in this market center by the promotional lighting department of the Los Angeles Bureau of Power and Light, the night picture presented was that below.



NEW lighting made a much more attractive display, as may be seen from the illustration below. The interior intensity is now approximately 50-foot candles, the additional load is 25 kw.



Construction

Standardized Forms For Inspection Procedure

SOUTHWEST is a fictitious city, but it is a typical city. It is not only the smallest but the largest city in the West. Its building conditions are most severe. At times one inspector handles all departments of city building inspection, while at others the offices are large and accommodate the corps of inspectors necessary to cover all of its activities.

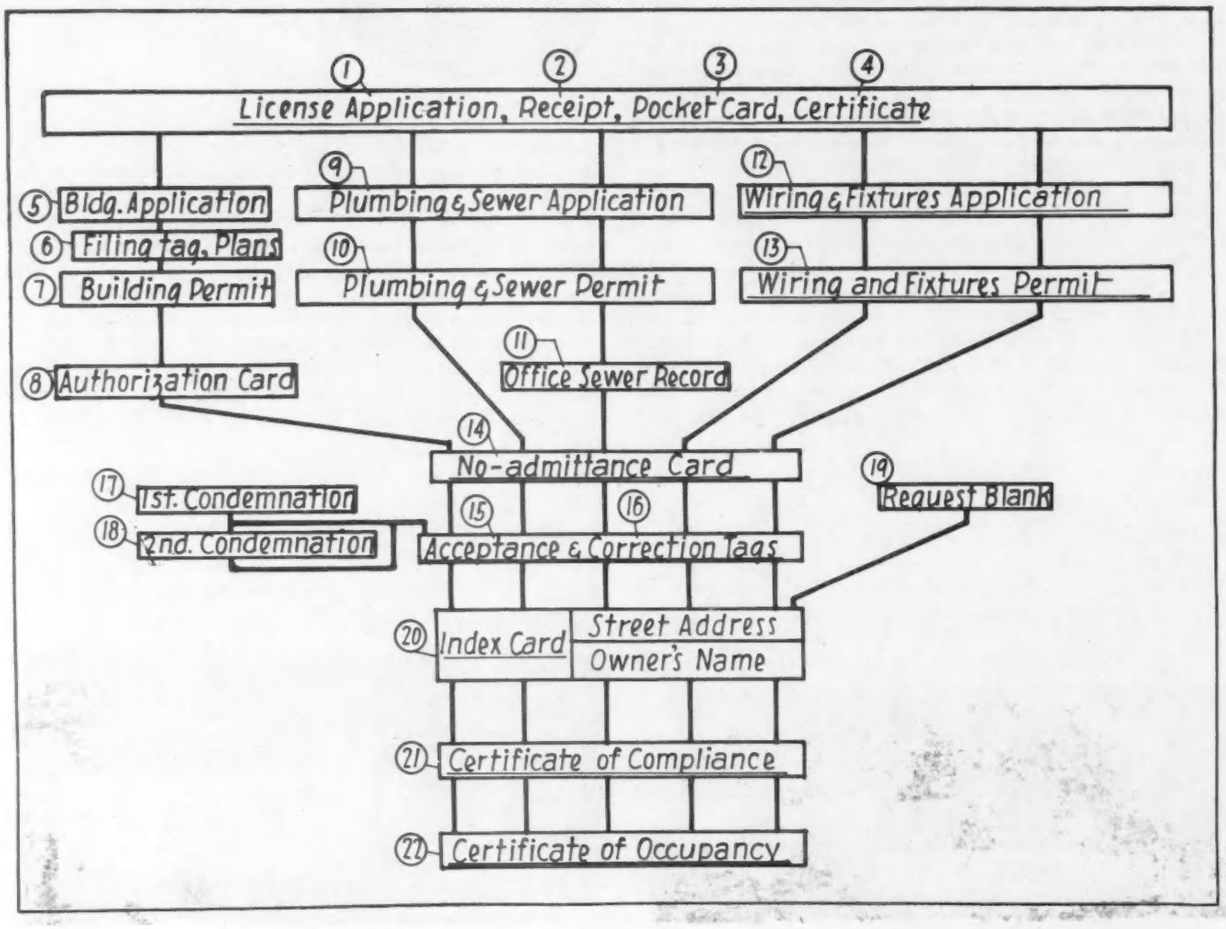
For such a city this system of forms and record procedure was devised. Certainly, if the system meets the conditions of the City of Southwest it is worthy of adoption and standardization everywhere in the West. It is effective, it is speedy, and it is simple. Yet it omits nothing that is necessary, nor does it add anything unnecessary. It is fast enough so that the complete history of any building project in the city can be assembled for review in 50 seconds. It is complete enough so that all essential information can be supplied.

Need has long been felt by the members of the Southwestern Section of the International Association of Electrical Inspectors for such a standardized set of printed forms for electrical and inter-related construction departments. At a meeting held on Jan. 17, 1930, a committee consisting of Arthur Veit (chairman), Alhambra, C. B. Pickett, Coronado, and T. C. Combs, Upland, Calif., was appointed by A. E. Johnstone, president of the Southwestern Section, to make recommendations. These were to cover not only the forms themselves, but a method of filing them. The committee was to act in co-operation with a similar committee of the Pacific Coast Building Officials Conference.

From a thorough study of the functioning of a large number of municipal offices in southern California, the forms which are reproduced here were evolved as those embracing the good features of the best and as supplying all the deficiencies found in all other systems.

The committee is anxious to have the constructive criticism of inspectors everywhere as to the system suggested, in the interest of evolving as perfect, flexible, and yet standard a set of office records as is possible of attainment. Much discussion of these forms is expected at the annual convention of the Southwestern Section, at Pasadena, Oct. 6-8.

The entire system is best outlined by the chart shown below, in which the relation of all forms is depicted. Those forms which deal with the electrical department are so designated and, because space has been limited herein, only those forms have been reproduced.



APPLICATION FOR EXAMINATION
ELECTRICIAN'S CITY REGISTRATION
CITY HALL

Southwest, Calif.,

....., 193.....

TO BOARD OF ELECTRICAL EXAMINERS
CITY OF SOUTHWEST,
SOUTHWEST, CALIFORNIA

Gentlemen: I hereby make application for examination as Electrician as provided for in CITY ORDINANCE No. 1415, approved March 6, 1927.

Respectfully,
Name.....

Place of Business.....
Residence .....

TO BE FILLED OUT BY APPLICANT

No..... Date.....

Experience .....

1. How long did you serve as apprentice?.....
2. Where and with whom?.....
3. Your age at last birthday?.....
4. How long have you worked as journeyman?..... With whom and in what cities?.....
5. What class of work have you been accustomed to execute?.....
6. Have you been in business as a master electrician?..... Where and how long?.....
7. How many men did you employ?.....
8. What examinations have you taken as master electrician, as required by states or municipalities?.....
9. Give list of state licenses you have held or now hold?.....
10. Have you held membership in any master electrician's association?

I hereby swear that the statements as made by me as to my experience are true to the best of my knowledge.

Signature.....

Form 1. License application. Suggested size, 5 x 8 in.

CITY OF SOUTHWEST, CALIFORNIA
DEPARTMENT OF ELECTRICITY
Board of Electrical Examiners

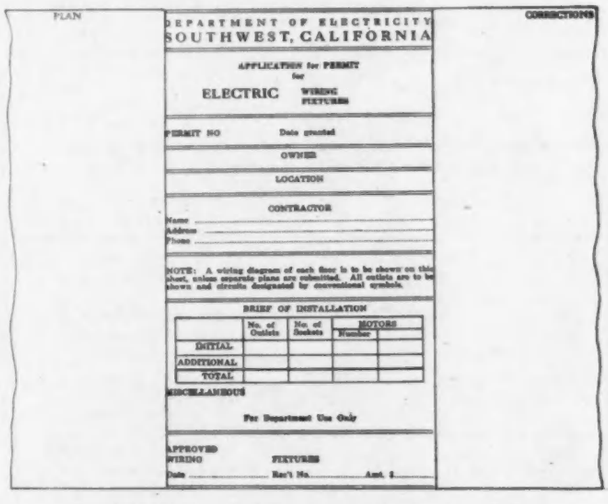
Certificate of Examination No. .....

This is to certify that.....
has been duly examined and registered as a Class .....
..... ELECTRICIAN

Chairman Secretary

This Card Expires Dec. 31, 19.....

Form 3. Pocket card, issued with receipt


PLAN

DEPARTMENT OF ELECTRICITY
SOUTHWEST, CALIFORNIA

APPLICATION for PERMIT for
ELECTRIC WIRING FIXTURES

PERMIT NO Date granted

OWNER

LOCATION

CONTRACTOR
Name
Address
Phone

NOTE: A wiring diagram of each floor is to be shown on this sheet, unless separate plans are submitted. All outlets are to be shown and circuits designated by conventional symbols.

BRIEF OF INSTALLATION

	No. of Outlets	No. of Sockets	MOTORS Number	
INITIAL				
ADDITIONAL				
TOTAL				

MISCELLANEOUS

For Department Use Only

APPROVED WIRING FIXTURES
Date Rec't No. Amt. $

CORRECTIONS

Form 12. Wiring and fixtures application in standard legal form. Contractor turns in one form each for wiring and fixtures, these afterwards are checked on job by the inspector. Suggest filing by permit number

No.....

CONTRACTORS LICENSE RECEIPT
CITY OF SOUTHWEST, CALIFORNIA
BUILDING DEPARTMENT

Southwest, California....., 19.....

....., whose State License No. is.....
having paid $..... into the City Treasury, is hereby granted a .....License to conduct the business of ..... in the City of Southwest for the term of....., from..... to....., in conformity with the provisions of the Ordinances of the City of Southwest.

.....
Building Inspector.

Form 2. License receipt. These are to be bound in books of 50, in duplicate. Size, 5 x 8 in. If not issued by building inspector, title of issuer should be substituted

$..... No.....

CERTIFICATE OF LICENSE
CITY OF SOUTHWEST, CALIFORNIA
DEPARTMENT OF ELECTRICITY
Board of Electrical Examiners

This Certifies that.....
has been duly examined and registered to act as a.....
.....Electrician, until December 31, 19.....

Seal Chairman

Form 4. Certificate, issued with receipt, to be framed. Size, 4½ x 7 in.

No.....

CITY OF SOUTHWEST, CALIFORNIA
BUILDING DEPARTMENT

....., 19.....

Permission is hereby granted.....
Address .....
to do Electrical.....work at .....
Street Address.....
Cost of job $..... Permit fee $.....

This permit is based upon certain written application for said work duly filed in this office, which said application is hereby referred to and made a part hereof; and is subject to all the rules and regulations set forth in the ordinances of the City of Southwest in regard to such work, and all amendments thereto.

.....
Electrical Inspector.

Form 13. Wiring and fixtures permits should be in books, duplicate or triplicate, numbered serially

ITEMIZED WIRING FIXTURES INSTALLATION

LOCATION BY ROOMS (List each outlet separately)	Circuit No.	Number of Outlets	Number of Sockets	Switches	REMARKS

Form 12. (Reverse side.) Here is entered the itemized tabulation of switches, outlets, and sockets by location in rooms. The front and back of Form 12 hold the key to an entire electrical wiring job

CITY OF SOUTHWEST, CALIFORNIA
BUILDING DEPARTMENT

421 N. Broadway Phone: SW. 4900

Inspector called on....., 19.....
at .....
and was unable to gain admission to premises.
Will you kindly notify this office when..... inspection can be made.

.....
Inspector.

Form 14. Not necessary but desirable is this tag

City of Southwest, California **Building Dept.** Phone No.....

ACCEPTANCE NOTICE

....work accepted
Location .....
.....Permit No. ..... Date approved....., 19.....

.....
Inspector.

City of Southwest **421 N. Broadway**
Building Dept. **Phone: S.W. 4900**

Form 15. Acceptance tag should be necessary before further work proceeds. Every construction step requires a tag

Forms 17 and 18 are notices of condemnation. Owners of condemned property receive the first notice, with specifications of work to be done. Final notice requires immediate quitting of property or commencement of work

No.....

FINAL NOTICE OF CONDEMNATION
CITY OF SOUTHWEST, CALIFORNIA
BUILDING DEPARTMENT

Southwest, California,

....., 19.....

To .....
at .....
Owner, agent, or tenant of the property and improvement below:
You are hereby notified that the building and/or structure owned or controlled by you and located at.....
.....
in said City of Southwest, California, and known further as.....
.....
(legal description)

is found, after careful inspection and investigation by the undersigned Building Inspector of this City of Southwest, to be a sanitary, structural or fire hazard or menance and that an emergency exists in relation thereto, and accordingly the same is hereby condemned in compliance with the provisions of Section 301 of the Uniform Building Code of Pacific Coast Building Officials Conference, as adopted by this City.
You are further notified that the following is required to be done, to place such building and/or structure in safe condition:
.....
.....

The abovementioned building and/or structure shall not be occupied or used for any purpose after service of this written notice until the instruction of the undersigned Building Inspector in relation thereto have been complied with, as hereinbefore set forth. Should the necessary changes not be made within thirty days after the service of this Final Notice the Board of Trustees may order the Building Inspector to proceed with the work specified in such notice. A statement of the cost of such work shall be transmitted to the Board of Trustees, who shall cause the same to be paid and levied as a lien against the property.
Of This Take Due Notice.

.....
Building Inspector.

CORRECTION NOTICE

.....Permit No. ..... Date....., 19.....
....work NOT ACCEPTED
Location .....
..... Inspector

Corrections have been made

Date....., 19..... Signed.....
Journeyman.
Note: Leave this tag for the Inspector,

Form 16. Correction tags show on back what added or changed work is necessary. Journeymen should sign correction tag before acceptance is given, thus giving filing check on each electrician

AFFIDAVIT

State of California,)
) ss.
County of Southwest,)

Comes now..... and first being duly sworn on oath deposes and says, that at the time of the service of the Notice or papers herein referred to, he was the duly appointed, qualified and acting Building Inspector, or his regularly authorized deputy, of the City of Southwest in the State of California, and that he personally served the within Notice of Condemnation on the said.....;
and ..... and.....;
by delivering to and leaving with him and/or each of them an original copy thereof, duly signed by the undersigned, and a copy of which said Notice served in each instance herein indicated being hereto attached and made a part hereof for all purposes; and that such service was thus personally made in the City of Southwest in the County of Southwest, and State of California on the.....day of....., 193.....

.....
Building Inspector.

Subscribed and sworn to before me this.....day of....., 1930.

.....
N. P. In and for the County of ....., State of California.

Form 18A. This affidavit of service accompanies both Forms 17 and 18. Thus, legal assurance is given that notice has been served

Form 19. For housing and sanitary conditions which do not warrant formal condemnation, this form is convenient

No. .....

CITY OF SOUTHWEST

Southwest, California, ..., 19.....

To.....
at.....

You are hereby notified that the.....
..... by you located at.....
law
.....is existing in violation of the.....
ordinance
in that: .....
.....
.....
.....
.....

You are directed to secure an abatement of the above condition within ..... days.

....
Building Inspector Health Officer

Location			Street (20)	
Owner				
Lot Block		Tract		
OK DATE	Item	Contractor	PERMIT DATE ISSUED	PERMIT NO.
	Building			
	Plumbing			
	Sewer			
	Wiring			
	Fixtures			
	Plastering			
	Occupancy			

Form 20. Data of all construction on any job are kept by means of this form

No.....

Plan No.....

CERTIFICATE OF COMPLIANCE
CITY OF SOUTHWEST, CALIFORNIA
BUILDING DEPARTMENT

THIS IS TO CERTIFY that the (description of bldg. or structure).....

.....

erected on Lot No..... Block No....., ...Tract
Street address.....
Owner .....
Contractor .....
authorized by Building Permit No..... has been completed in a satisfactory manner and that the regulations of the Uniform Building Code of the City of Southwest affecting the structural features of such building or structure have been complied with except as follows:

.....
.....
.....

City of Southwest, California, ..., 19.....

.....Registered Inspector

Group..... Type..... Approved: .....
Fire Zone..... Building Inspector
Use Zone.....

Form 21. Registered inspectors signify by this form that work under their jurisdiction has been satisfactorily completed. Duplicate of each certificate kept on file with building inspector

No.....

CERTIFICATE OF OCCUPANCY
CITY OF SOUTHWEST, CALIFORNIA
BUILDING DEPARTMENT

THIS IS TO CERTIFY, that the.....
.....Type No. ..... building described below and in Building Permit No....., located in Fire Zone No....., has been inspected and complies with the regulations of the City of Southwest and State of California and amendments thereto, and shall be used and occupied subject to the following classification:

Group..... Division..... Occupancy.....
Maximum allowable floor load: 1st Floor.....lbs./sq.ft.; 2nd Floor .....; 3rd Floor.....; 4th Floor.....; and 5th Floor ..... lbs./sq.ft.

.....
Address .....
Lot No..... Block No.....Tract
Owner's name..... Owner's address.....

Dated, Southwest, California, ..., 19.....

Signed.....
Building Inspector.

Note: Alteration, Change, Addition or Changes of Occupancy Void this Certificate.

Form 22. This is the final approval of the entire job. Owner or agent may show this before gas and electric meter installation, or this may be final approval for one occupancy, to be changed should such occupancy be changed. In that case, a stamp as below might be used

TEMPORARY
UNTIL ....., 19.....

£631

Building DEPARTMENT

Receipts From The Following Sources			Deposit To The Following Funds		
Building Permits	64	00			
Plumbing "	18	00			
Electrical "	8	30			
	$90	30			

Alhambra, California, May 1, 1930

RECEIVED OF

Ninety and 30/100 DOLLARS

$90 30/100

CITY TREASURER

Summary sheet, which with the permit fee sheet shown below, is made out in triplicate. One of these is signed by the city treasurer as a receipt for the funds turned over to him at the end of the day

The accounting for the fees collected under the various headings is kept on this form in triplicate, which is then summarized on the sheet shown on the right

№ 1497

May 1, 1930

Date	Permit No.	Address	Cost	Total Building Permits	Value of Building	Building	Plumbing	Electrical	Business	Dog	6	Code Books	Misc. Rev.	Plumb. Exam.
	15132	836 N 7th St	1 00	3500 00	3600 00	1 00								
	17172	836 N 7th St	2 00					2 00						
	15015	2924 Midwick Dr	2 00				2 00							
	17173	1202 N Raymond Ave	2 00					2 00						
	15016	114 W Queen St	2 00				2 00							
	15138	1705 Edgewood Dr	8 00	7500 00	4000 00	8 00								
	15134	520 N El Molino St	8 00	11500 00	4000 00	8 00								
	15135	1840 N Raymond Ave	8 00	15500 00	4000 00	8 00								
	15017	2588-92 Birch St	1 00				1 00							
	15136	227 W Mesa St	2 00	18000 00	500 00	2 00								
	15138	1729 Campbell Ave	8 00	20000 00	4000 00	8 00								
	17174	305½ W 4th St	2 00					2 00						
	15137	1424 N Monterey St	10 00	25000 00	5000 00	10 00								
	15139	1505 N Monterey St	10 00	30000 00	5000 00	10 00								
	15140	525 N Pasqual Ave	2 00	30000 00	50 00	2 00								
	15018	836 N 7th St	3 00				3 00							
	15019	2114 Arnaga St	3 00				3 00							
	15020	518 La Paloma Ave	3 00				3 00							
	15021	1814 Santa Rita Ave	3 00				3 00							
	15022	516 N Hillman Ave	1 00				1 00							
TOTAL		F-73—1930—6 '29	90 30			64 00	18 00	8 30						

631

Building 64 00
Plumbing 18 00
Electrical 8 30

$90 30/100

Day and night views of Moreing Field, Sacramento, from the same location. In the day view the reflector banks may be seen mounted

More Light— More Fans

Since Increased Attendance Spelled Success for Sacramento's Night Lighting Experiment, More Pacific Coast Baseball Fields Are Being Equipped for Night Games

By W. E. CAMP
Camp and French, Contracting Engineers, Sacramento, Calif.

WHEN Governor Young stepped to the plate in Moreing Field, Sacramento, on the evening of June 10 at 8:30 p.m., and rapped the first pitched ball for a single, thus opening the Oakland-Sacramento series, he started the first night baseball on the Pacific Coast.

A notable gathering assembled to witness this game, many to pass on its possibilities. Club owners, baseball officials, scouts, sports writers, athletic managers and others interested in the business end of sports were there to view the game with a critical eye. The general attitude toward night baseball was friendly, but skeptical. It was felt that the night game offered many advantages, both to the public and to the clubs, if first-class baseball could be played successfully under artificial illumination. But the game was decidedly on trial.

The first night went off smoothly with heavy hitting and fast fielding. The clear visibility of the ball and the absence of shadows were apparent surprises to the spectators. The highest pop-ups and the longest drives could be followed with ease. Players seemed to adjust themselves quickly after the first touch of nervousness passed, and settled down to steady, fast baseball. In the excitement of the game the crowd seemed soon to forget the novelty of night environment and centered its attention on the play.

Succeeding nights have been very much the same. Night baseball has proved every bit as fast as the best day games. One of the shortest games on record in Moreing Field was under the lights, nine innings being dashed off in one hour and thirteen minutes. Critics have become unanimous in their approval.

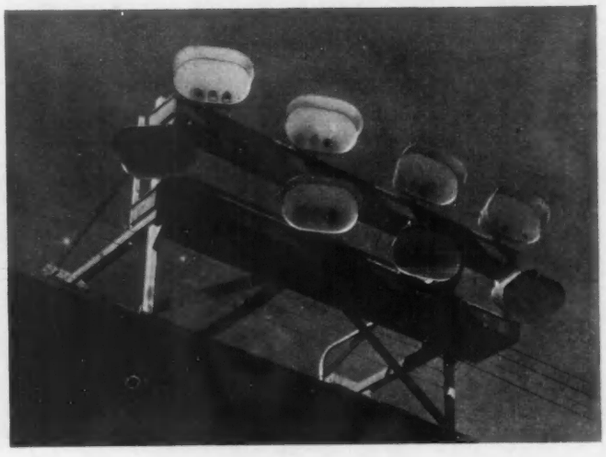
One of the roof banks of reflectors. Mounting and adjustment features can be seen here

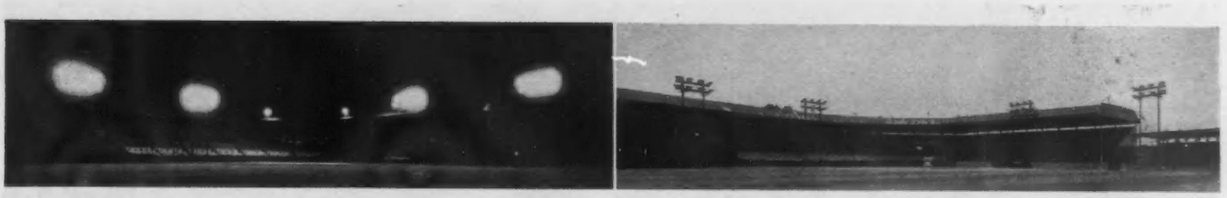
In some respects, certain obstacles common to day play have been removed by lighting; day shadows, direct sun glare, the vague "high sky," cloudy days of restricted visibility and other day difficulties.

Pleasantly cool evenings, large attendance, greater enthusiäsm and more spontaneous baseball spirit are a distinct asset to the night game. It is still too early to predict entire success, but early returns have exceeded all expectations. The average attendance thus far has been about tripled; the former high attendance of Sunday games has now become about the average nightly record. From what can be learned, this seems also to be representative of the Middle Western fields where night ball is now being played.

Results at Sacramento have definitely settled the question in all of the Pacific Coast League cities and some six or seven fields are now being so equipped as rapidly as possible. Among them are Los Angeles, Phoenix, Portland, Oakland, Fresno and Seattle.

Floodlighting projectors used have been developed by the Giant Manufacturing Company of Council Bluffs, Iowa, for the illumination of large areas. There were 46 of these projectors used at Moreing Field, each projector being equipped with three 1,500-watt, clear Mazda lamps. This type of projector is weatherproof, made of cast aluminum and galvanized metal, and weighs about 150 lb. It is double elliptical in shape, about 48 in. across the horizontal opening and 36 in. across the vertical. The horizontal beam spread is 113 deg., and the vertical spread 80 deg., the interior being finished with a nonglare surface. Each lamp is mounted tip down and permanently in focus in individual concavities. A swivel





Day and night views of the Sacramento ball park from the back field. This installation is typical of all the Coast League fields with the exception of that at Los Angeles

type base permits rigid support and adjustment. The projector hood is equipped with a cap type visor.

Power is supplied to the field by the Pacific Gas and Electric Company at 3-phase, 4-wire, 208/120 volts. The installation was made by Camp & French, contracting engineers, Sacramento, Calif.

The switchboard consists of a main, fused service switch, metal meter cabinet, bus raceway, two main fused circuit switches, two remote control air break, magnetic switches, and necessary small control switches.

The load is divided into two circuits at the main bus, one side serving right field, the other left field. For convenience, the master push button control switches are mounted some distance away in the locker room.

Two different mounting heights are used for the projectors. The lower units are 55 ft. above ground, and the upper units 60 ft. All lower units with but two exceptions are inclined 13 deg. below the horizontal, the upper units being set exactly horizontal.

Four banks of projectors, eight units to the bank, are used for the infield illumination. Two projectors on the grandstand roof are trained directly on home plate, one of these being directly along first base line, the other along third base line.

Of the four main banks for the infield, one is on the grandstand roof opposite third base and 50 ft. away. Another similar bank of eight projectors is 100 ft. from this bank and 35 ft. back from left foul line. This bank is mounted on a structure built on two 70-ft. poles set 8 ft. in ground and on 15-ft. centers. The supporting structure is 24 ft. long and 4 ft. wide and is double-decked to provide for the two mounting heights. The projector bases are bolted to the platforms with the projector bodies overhanging the forward edges.

The two main banks in the right infield are arranged in the same manner as in the left field except that the first bank back of first base is mounted on the double pole arrangement rather than on the grandstand roof, as the roof was set too far back to be usable at this point.

In the right and left field corners 70-ft. poles are used for mounting three projectors, the center projector of which is mounted directly on top of the pole at 60 ft. above the ground, the end projectors being 6 ft. 6 in. apart on crossarm supports and 55 ft. above ground.

The right and left outfield banks are arranged and mounted in the same manner as the corner units and are located 140 ft. from the field corners. Moreing Field measures 325 ft. from home plate to right and left field fences along the foul lines.

Conduit and rubber-covered cables were terminated at the first infield banks, and from that point weatherproof conductors and vertical overhead line construction was used.

In order to facilitate the training of the projectors and save night work each projector was numbered and its proper position referred to a base line on the field extended from home plate through second base to the center field. The proper positions along this line were tagged with the various projector numbers. In this manner all adjustments were made in some three or four hours by day, and only one or two minor changes were found necessary.

Light from the field provides amply for the grandstand and bleachers. Incidental lighting was provided for entrances, exits and passage ways. Also RLM reflectors were used to illuminate the parking areas around the outside of the grandstand. These units were mounted around the upper outside of the grandstand roof.

Foot-candle intensities on the various field positions are as follows:

Home plate, 23 foot-candles.
Pitcher's box, 21 foot-candles.
First base, 22 foot-candles.
Second base, 14 foot-candles.
Third base, 20 foot-candles.
Left field position, 11 foot-candles.
Center field position, 8 foot-candles.
Right field position, 10 foot-candles.
(These readings were taken by the writer with a standard Mazda foot-candle meter.)

It has become the custom at Moreing Field to switch off the lights for a few seconds for the usual seventh inning rally. This invariably produces a thrill to the spectators, and emphasizes to a rather startling degree that darkness is the absence of light.

Wrigley Field in Los Angeles is now considered one of the best floodlighted baseball fields in the world. Biggest of athletic field illumination jobs in the West, it took but 22 days to install the 156 Crouse-Hinds floodlights used. Three tiers of projectors along the grandstand, including four 40-ft. steel supporting towers with 16 units each, and two 120-ft. towers in the outfield supporting 18 units each, supply an intensity of 19 foot-candles in the outfield, 28 in the infield, and 45 at home plate. A toy balloon may be easily seen 500 ft. above the field. Units are equipped with 20-in. spread lenses and 1,500-watt lamps on a 110-volt circuit

Mactolf-Doll, Glendale Electragists, wired this excellent Gittelson Bros. course in Los Angeles, as well as the first Red Seal course, for A. G. Sunderland, at Glendale

Light Inversely as the Square of the Golf

Demi-tasse Courses Pay Best When the Lights are Bright and the Job Well Laid Out and Installed

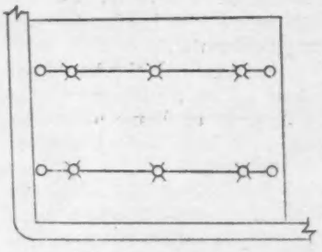
By F. B. NIGHTINGALE

Illuminating Engineer, General Electric Supply Corporation, Los Angeles

MINIATURE golf has taken the West by storm. From Bellingham to Calexico overnight unsightly vacant lots are being transformed into attractive courses where thousands of people nightly enjoy an outdoor game. Fad though it may be, it is the beginning of the enjoyment of outdoor sports under illumination.

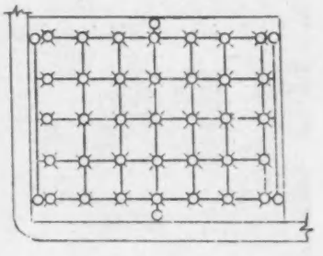
Two factors can be capitalized by the contractor to sell a really high-grade installation. First: Approximately 85 per cent of the revenue will be received after sunset. That course which is free from glare and insects, is well lighted, is comfortable, will survive longest. Second: If the sport is a fad the owner who has a good installation can convert, with profit, all or a part of his course to tennis, roque, bowling, or some other sport.

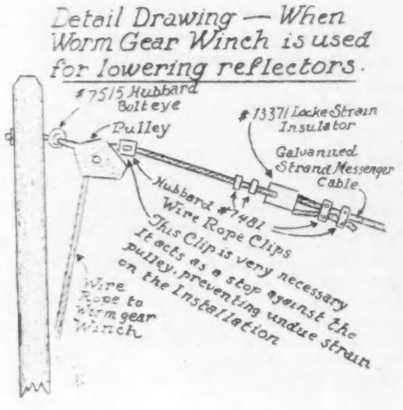
On this and the facing page are shown in detail some of the features which make a profitable installation.



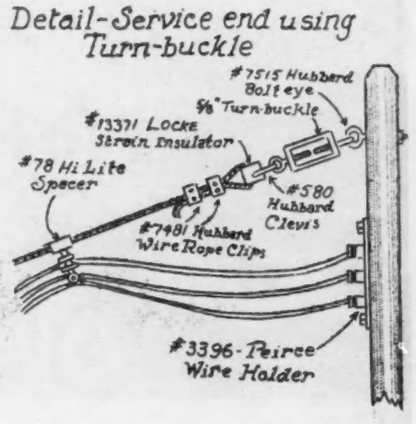
Preferable method of layout is that employing wider spacing with deep bowl tennis court units, such as Ivanhoe 835, 750-watt, general service lamps, mounted 25 ft. from ground to light center

A good alternate method makes use of closer spacing as shown at right—RLM dome reflectors with 200-watt bowl enameled lamps, mounted 12 ft. from ground to light center

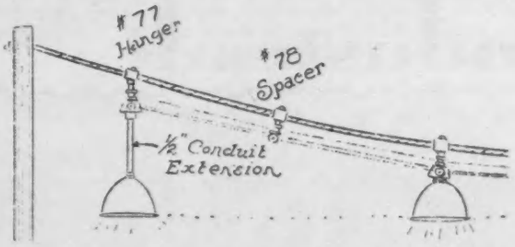



Detail Drawing — When Worm Gear Winch is used for lowering reflectors.
#7515 Hubbard Bolt eye
Pulley
#1337 Locke Strain Insulator
Galvanized Strand Messenger Cable
Hubbard #7481 Wire Rope Clips
This Clip is very necessary It acts as a stop against the pulley, preventing undue strain on the Installation
Wire Rope to Worm gear Winch

For assembly the messenger cables are strung between the poles 6 ft. off the ground, the hangers and spacers shown on the next page attached, the wires run and then raised to the bolt eye at the poletop, as shown here. The service end is wired to the service by means of a wire holder. If a winch is used for raising and lowering it is used on the dead end as shown at left. Weight is a vital factor in overhead installations. With this system a tennis court 125 ft. long can be spanned with total equipment weight of reflectors, lamps, hangers, service and messenger wires of less than 100 lb.



Too low units cause unnecessary glare and reduce the lighting effect by shadows. Harmful to the eyes of the players, low units also allow attracted insects to interfere with calm playing



ABOVE: *To allow for sag in the messenger cable ½-in. conduit extensions may be used to hang all reflectors on the same level*

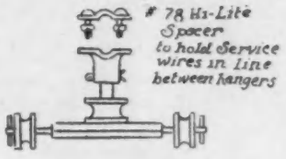
AFTER investigation, the high mounting unit proves best suited to the purpose. It weighs, with lamp, but 5½ lb.; lamps from 750 to 1,500 watts can be used in it; the reflector is designed for outdoor sports and gives wide distribution with a proper shielding of the light source.

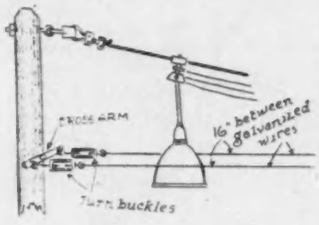
The standard recommendation for miniature golf is approximately 7 foot-candles. With this unit, lamped at 750 watts, the first row 20 ft. in from the edge of the playing field and on 40-ft. spacing thereafter, with reflectors 25 ft. above the field, makes an excellent installation.

The use of low-mounted porcelain enameled reflectors gives a tendency to glare, attracts flying insects, increases labor cost in installation for the same intensity, has poor efficiency, and costs more to operate.

Nearly everywhere the local power company will install poles for the contractor at a reasonable cost and insure a well supported system.

Non-rusting spacer to be clamped on messenger wire, containing three insulators to carry 110/220-volt, 3-wire service, a feature which balances the load and allows longer wire runs

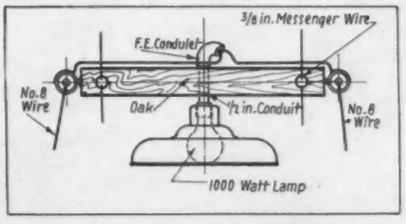




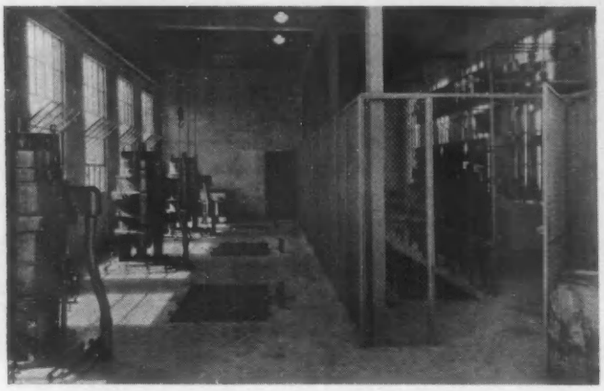
When mounted in a windy location two No. 10 galvanized wires spaced 16 in. apart and mounted as shown at left will prevent sway without interfering when equipment is lowered for lamping

Every pole installed by Mr. Eklund was well guyed. The course was laid out by Gilbert Trosper, lighting salesman for the P. G. and E. The installation, including clubhouse wiring, ran over $1,000, but the excellent lighting has brought bigger patronage

Several features were pioneered by Harry Eklund, San Rafael Electragist, at the Westland course. The hanger, shown at right, is an example. It is braced against wind sway. From 12 to 22 foot-candle intensity is produced by the fifteen 1,000-watt RLM units, on 32 x 40-ft. spacing, mounted on 40-ft. poles



Industrial



Interior showing pumps, conduit stubbed in place for future pumps, open bus switchboard, and general layout

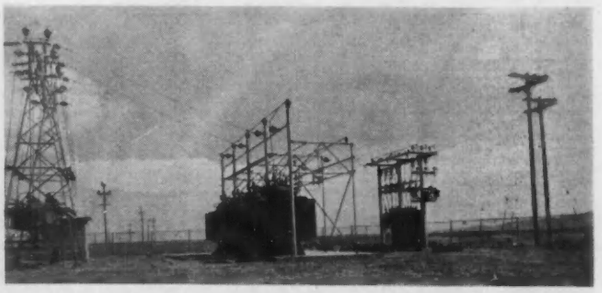
Making Water Run Uphill

Up Six Canal Steps Electric Pumps Lift Water 140 Ft. to Irrigate *en masse* Rather Than by Numerous Individual Pumping Plants 22,000 Acres on the West Side of the San Joaquin Valley

IRRIGATION projects, in the commonly accepted sense of the term, consist of carrying water by gravity from a high source of supply, by means of canals, to lower levels for use. Where electricity has played a part in such a scheme at all, it has been usually as a byproduct of generation resulting from utilization of this difference in head.

But at the West Stanislaus Irrigation District, on the west side of the Upper San Joaquin Valley (Calif.) the process is completely reversed. The water in that district is lifted by electrically driven pumps up a series of steps in the form of canal reservoirs, from which it is distributed by means of laterals over the 22,000 acres under cultivation. The engineering problem, therefore, was one of designing a system which would reverse the usual practice and still accomplish its prime purpose economically.

The system as laid out consists of a series of six trunk canals extending in a straight line almost at right angles to the river's source of supply and to the mountains on the west side of the valley. Each of these canals is 23 ft. higher than the preceding canal from which it is supplied. Each is fed by a pumping station which lifts the water from the canal below it to the next level. Thus the system consists of six concrete lined canals, some 2½ miles long, and six pumping plants established in a line extending from the intake canal, which itself comes two miles from the confluence of the San Joaquin and the Tuolumne Rivers, to the foothills of the west side.



ABOVE: *Power company's step-down substation for the district project; meter house at left to rear of bus structure*

Water from these canals is then tapped off by a series of laterals leading from both sides of the canals. These laterals in turn are tapped to shorter distribution laterals for individual farm plot irrigation.

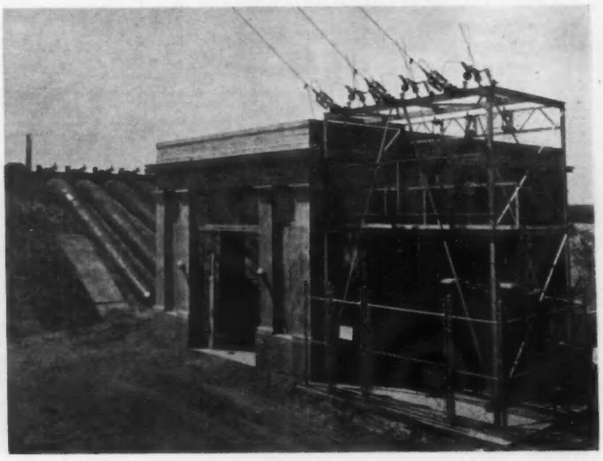
The electrical part of such a system therefore becomes of first importance. On it the entire scheme depends. Likewise it is desirable that it be practically automatic in operation, adjusting itself instantaneously to the head of water required on any part of the distribution without disturbing the supply to any other part of the system.

These requirements have been met very successfully by W. F. Woolley, chief engineer for the district.

Power is obtained from the Pacific Gas and Electric Company at a special substation near the lowest pumping plant, or in other words, near the center of the heaviest load. It is stepped down here from 66 kv. to 11 kv., and metered and distributed at this voltage over a latticed steel pole line which parallels the main canal system. At the power company's substation is housed the recording voltmeter and wattmeter of the district and a main oil switch by which the distributing system may be shut down. The latticed steel pole distribution line employs seven-strand hard drawn No. 0 copper wire on standard insulators. Each of the poles is set to grade in concrete foundations and lined up with respect to the canal. The system thus makes a very pleasing appearance.

At each pumping plant power is again stepped down at an outdoor substation from the 11-kv. distribution to 440 volts for the pump motors. At these outdoor substations are the usual substation switch gear and choke coil arresters and other standard equipment.

BELOW: *One of the six concrete pumping plant buildings and its substation*



ABOVE: *Discharge end of pump penstocks at foot of a typical canal. The float valve operating the pumps is housed over by the box at left. The syphon spillway is at the right. Note the counterweighted flap valves with dashpot equipment to ease closing*

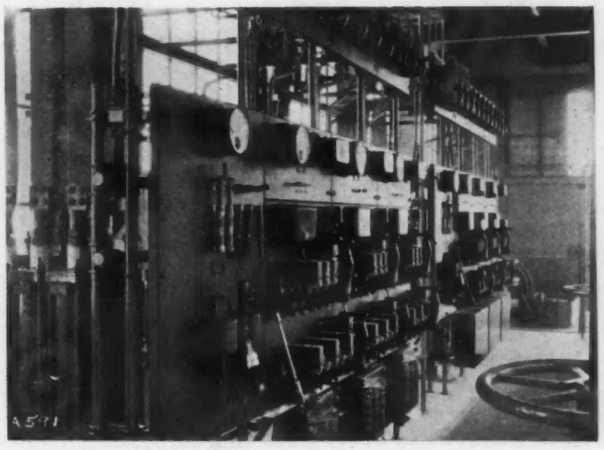
Water comes by means of a two-mile gravity flow canal from the river diversion to the base of the first power plant. Here the lift varies from 18 to 35 ft., according to the stage of the river. At this station, because it must supply the water for the entire system, the primary installation consisted of three 200-hp. motor-driven pumps to be supplemented by three more immediately. To serve these the transformer installation at pumping plant No. 1 consists of three 500-kva. transformers. At the second station, where 150-hp. pumps are in use, three 333-kva. transformers are installed. At each of the pumping stations the capacity is thus reduced in accordance with the pumping requirements. No. 6 station consists of two units totaling 38,000 g.p.m. and requiring three 150-kva. transformers. There are 28 pumping units all exact duplicates and interchangeable.

Each motor is controlled by an automatic compensator of the self-contained 3-coil auto transformer type with 5-pole starting contactors and 3-pole running contactors.

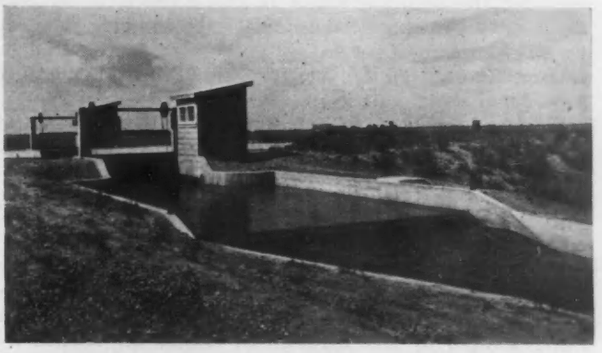
The transition from start to run is accomplished by definite time accelerating relays. Time delay relays are also provided to prevent all motors starting simultaneously. Starting and stopping of motors is accomplished with float switches so arranged that the water is maintained between certain definite levels in the canal automatically.

Inside each of the pumping plants is a switchboard, protected by a wire mesh cage because of its open bus layout. On this are mounted the G.E. automatic compensators and oil circuit breakers for the control of the pumps. The pumps are automatically started by means of float valves operating relays near the discharge

BELOW: *Completed switchboard at No. 1 plant*



BELOW: *A typical lateral canal tap to the main canal. The meters are installed in the small houses on each side of the canal. The radial valve operates automatically to maintain a constant head in the lateral canal*



end of the pump penstocks in each canal above the plant which supplies it. In event of any failure of the float to operate the relays, a siphon spillway is provided on the opposite side of the canal. Water from the canals thus will be siphoned to the canal below it, should the level rise to a such a height as to threaten the banks of the ditches.

This installation makes use for the first time in the West of the Pelton-Moody spiral pump, which operates at high speed and high efficiency and gives a lower operating cost and high power factor. These pumps are always primed. Operating at high speed the pumps are run wide open all the time. No valves are necessary with the exception of the flap valve at the discharge end of each penstock. These flap valves, specially designed by the Pelton company, are weighted for counterbalance and have a dashpot attachment to ease the closing of the valve with the shutdown of the pumps.

Except at the first pumping plant, the lift at each of the stations is 23 ft.

Each of the pumping plants is attractively constructed of reinforced concrete. Each is provided with a bridge crane of 5-ton capacity and all floors are designed to carry loaded trucks for the change of equipment if necessary. In all, seventeen pumps were installed in the original installation, which was made by the Butte Electric & Manufacturing Company of San Francisco. Eleven more pumps are now being added, making a total of 28 for the project. This is designed to give 270 cu.ft. per second water capacity when completed. Full capacity of the upper stations was put in at the beginning and the lower stations are nearing completion.

Distribution of the water will prove of interest. The main canals are lined with 3½ in. of concrete, reinforced with ¼-in. steel rods on 12-in. centers lengthwise and 24-in. centers crosswise. Water depth in the main canal is 5½ ft.

Lateral canals are tapped off from each side of these main canals. There are 60 miles in the lateral system, 12 miles of which had already been lined with reinforced concrete 2½ in. thick, with reinforcing consisting of wire mesh, No. 10 and No. 12 B&S gage, on 4 x 12-in. centers.

Radial gates, automatically operated by means of a float and funnel arrangement, provide a predetermined head by allowing a certain amount of water to flow under them. Maintenance of this constant head of water is one of the critical features of the entire scheme. As the water level rises in the main canal, the radial gate closes. As the water level drops, the gate opens, keeping the

head of water in the laterals at a constant level. A Sparling meter is installed to keep a graphic record of the amount of water flowing over these gates at all times.

Likewise when the water level in a main canal drops, more of the pumping units in the stations below that canal are set in operation automatically to bring the head up to the required level. Only one man is required on each shift to guard the property and keep it oiled and in good condition.

To prevent surges in the canals due to shutdown of pumping units, which might cause an overflow of the banks suddenly, a box-like extension has been built into the sides of the canals about midpoint of their lengths. This takes up any surge of the water and helps to maintain the canals at even levels.

Consumers are supplied water from gates which tap the lateral canal system. The gates are operated by a screw which is calibrated by turns for the volume of water allowed to pass through it. Gates are opened by three or four attendants whose business it is to release the required head and to keep a record of the water used. Their records are checked back against the record of the Sparling meter record. Roads have been built to parallel the canals, making it easy for these men to cover and take care of the water demand for anyone in the district on very short notice. Their route brings them to each gate at from three- to four-hour intervals.

To check the water supply against the power cost is also a matter of comparative ease, because at each pumping plant meters give records of the operation of each of the pumps. These are checked against the main power meters at the power company's substation. Full advantage is taken of off-peak schedules by operating the system as much as possible between 11 p.m. and 6 a.m.

The cost of the system has not been high. For supplying a 22,000-acre district, the bonded indebtedness is about $55 per acre. Under present operating conditions it is possible to supply 2 acre-ft. of water to every acre in the district at $10 an acre. These figures include depreciation, interest, bond redemption and operating charges.

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Does Power Factor Correction Pay?

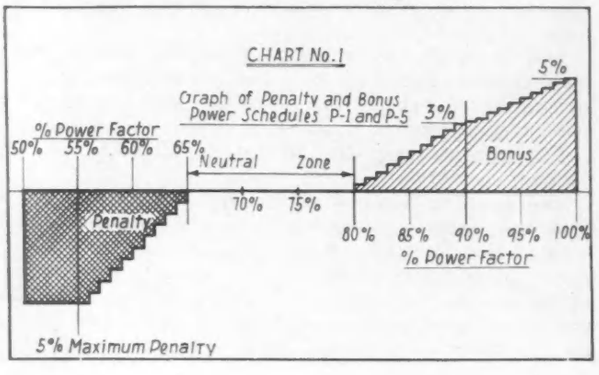
In Connection With Rewiring for Better Voltage Conditions, Economic Studies Show That It Does

By **Louis F. Leurey**
Consulting Electrical Engineer, San Francisco

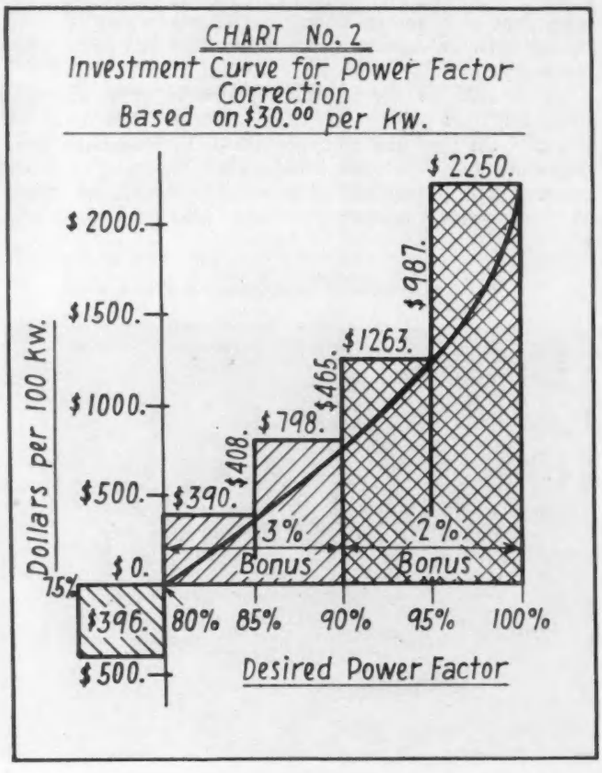
CORRECTION of power factor to meet the requirements of recently issued power company rate schedules in California divides itself into two distinct groups as are graphically illustrated by Chart 1.

Zones of Correction

For natural power factors below 65 per cent there is a uniform penalty of 0.5 per cent, but not exceeding a total of 5 per cent. In other words, there is no additional penalty for power factor below 55 per cent. It is quite evident that a consumer falling into this zone may be able by judicious investment to correct his power factor to 65 per cent, or slightly higher, and gain a material advantage in the total cost of power. It is equally clear that it would not pay him from the point of view of power cost alone to correct appreciably beyond 65 per cent, as he gains no commercial advantage in the zone between 65 per cent and 80 per cent.



There is, however, another angle to power factor correction in the zone of low power factor to which unfortunately very little attention is given, and which may in itself be well worth the cost of correction, regardless of the penalties involved in the power factor schedules.



The special advantage secured by such correction is the betterment of voltage within the consumer's own distribution system and the lowering of distribution losses by the elimination of wattless current.

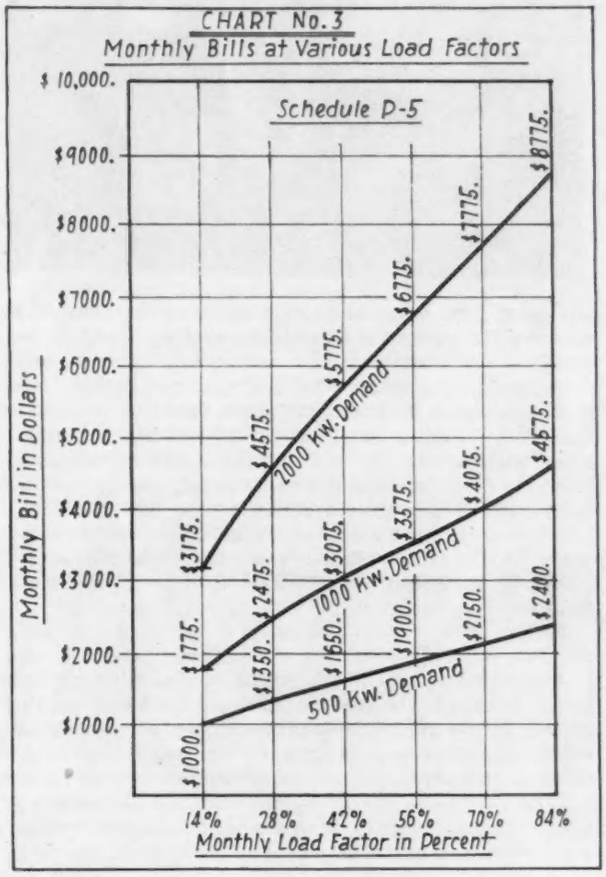
There is often an impression on the part of non-technical operators that as wattless current is not registered by the wattmeter it therefore causes them no out-of-pocket loss. They fail to take into account the fact that heat loss, due to the flow of wattless current, produces a true power component in the readings of the wattmeter. They further fail to realize that wattless current by limiting the current carrying capacity of wires and cables thereby increases the cost of the whole factory distribution system. It is impossible, of course, to estimate the advisability of corrective measures in any given case without a thorough study of the quantitative factors involved.

Power Factor Bonus

A further reference to Chart 1 shows that in the zone of bonus for power factors in excess of 80 per cent, the schedules break the bonus into two parts, 3 per cent being allowed for corrections between 80 and 90 per cent, and 2 per cent being allowed for corrections between 90 and 100 per cent.

Before examining the economic feasibility of attempting to secure power factor bonus, we must consider the cost of power factor correction in the zone from 75 per cent to 100 per cent, which is graphically illustrated by Chart 2. This chart is drawn to show the dollars of investment for each step in power factor correction based on each 100 kw. of load to be corrected, and further based on an estimated average cost of $30 per kva. of corrective equipment. The figure of $30 per kva. for the installed cost of the corrective equipment at first glance may seem high, but in considering the problem from a practical standpoint it must be remembered that corrective units cannot be secured in exact theoretical sizes required, and to be sure of securing an effective correction the actual corrections must be necessarily of a somewhat higher order. On this basis the figure of $30 will probably be very close to the average cost when equipment cost, installation and space allocation are all given their proper weight.

It will be seen readily from this chart that correction between 75 per cent and 95 per cent can be accomplished at a fairly uniform cost, but that correction from 95 per cent to 100 per cent is practically prohibitive in cost. It will be noted, furthermore, when considering the power companies' schedules, that correction from power factors below 80 per cent yield no bonus, but constitute a definite cost factor. Correction above 90 per cent is secured only at a rapidly increasing cost, and yields only a 2 per cent total bonus, whereas correction between 80 per cent and 90 per cent is the lowest in first cost and yields the highest per cent of bonus. Thus it will be seen that the ideal range for power factor correction, in order to secure bonus, is in the range of an initial power factor of 80 per cent and a corrected power factor of 90 per cent.



Effect of Load Factor and Maximum Demand

Chart 3 depicts graphically primary power schedule P-5, which is the usual schedule upon which loads of 500 hp. and over are billed. A glance at this chart shows that not only does the amount of the bill upon which the bonus is figured vary with the load factor of the consumer, but also varies with the maximum demand of the consumer's load. It is self-evident from this chart that the larger the consumer, the less favorable is his position for securing power factor bonus, and while the amount of the bonus does increase with the load factor of the load, it does not increase in straight percentage, but according to the curves as indicated in Chart 4. Consumers' loads having high load factor of the order of 70 per cent to 80 per cent often have inherent power factors higher than 80 per cent and consequently cannot fully apply corrective equipment in the zone where the greatest bonus can be obtained.

Fallacy of Attempt to Secure Power Factor Bonus

With the foregoing considerations in mind, it is advisable to consider Tables 1 and 2, which demonstrate the fallacy of attempting to secure by corrective equipment the bonus which the power companies' schedules offer for power factor in excess of 80 per cent.

Table 1 shows the economic result of attempting to correct loads of various size at an average monthly load

Table No. 1

Demand	Load Factor	Power Factor Correction	Investment @ $30.00 per kw.	Fixed Charge @ 15%	Annual Bonus * @ 36% per year	Net Loss
500 kw.	42%	From 80% to 90%	$4000.	$600.	$594.	0.15%
1,000 kw.	42%	From 80% to 90%	$8000.	$1200.	$1107.	1.16%
2,000 kw.	42%	From 80% to 90%	$16,000.	$2400.	$2079.	2.00%

Table No. 2

Demand	Load Factor	Power Factor Correction	Investment @ $30.00 per kw.	Fixed Charge @ 15%	Annual Bonus * @ 36% per year	Net Gain
500 kw.	70%	From 80% to 90%	$4000.	$600.	$774.	4.32%
1,000 kw.	70%	From 80% to 90%	$8000.	$1200.	$1467.	3.34%
2,000 kw.	70%	From 80% to 90%	$16,000.	$2400.	$2799.	2.50%

* Taken from Chart No. 3

factor of 42 per cent and in the most favorable zone between 80 per cent and 90 per cent power factor. The investments are all based on $30 per kw. of load corrected, and fixed charges are calculated at 15 per cent, which is certainly conservative in the case of an industrial company when interest, amortization, taxes and maintenance are taken into consideration.

This table shows clearly that under the assumption of $30 per kw. of load to be corrected the bonus return will not equal the annual fixed charges. It must be borne in mind that in the range of from 40 per cent to 50 per cent load factor will probably be found most of the cases in which the starting power factor is 80 per cent. It must also be borne in mind that in many cases the initial power factor may be somewhat below 80 per cent, in which case additional capital investment must be made with no increase in the bonus obtained.

Table 2 illustrates a similar set of calculations but in this case designed to cover a load factor of 70 per cent. Here the final economic balance indicates a net gain of from 2½ to 4 1/3 per cent based on investment incurred in correcting from 80 to 90 per cent power factor.

Even under these extremely favorable conditions it is apparent that the investment return is so small as not to warrant the serious attention of the consumer.

We must therefore conclude that the business of selling reactive current to the power companies is not a profitable one. As a matter of fact, the power companies can manufacture reactive kva. themselves under much more favorable conditions and the whole purpose of the penalty and bonus clause is to equalize the rate burden in proportion to the amount of equipment which the power company must dedicate to the consumer's service.

Conclusion

1. Power consumers of 500 hp. and over will receive a discount up to 5 per cent when the inherent characteristics of their load result in an average power factor above 80 per cent.

2. No consumer is warranted in making specific investment for the sole purpose of securing discount for high power factor.

3. Consumers may be warranted in making specific investment to correct low power factor for the value of voltage correction alone or in combination with the securing of power company discount.

4. No investment should be made for the purpose of power factor correction without a thorough investigation of the following economic factors involved:

(*a*) Total investment required to change initial to desired power factor.

(*b*) Annual fixed charges involved.

(*c*) Probable duration of the conditions under which the initial power factor was obtained.

(*d*) Effect of power factor correction on factory voltage.

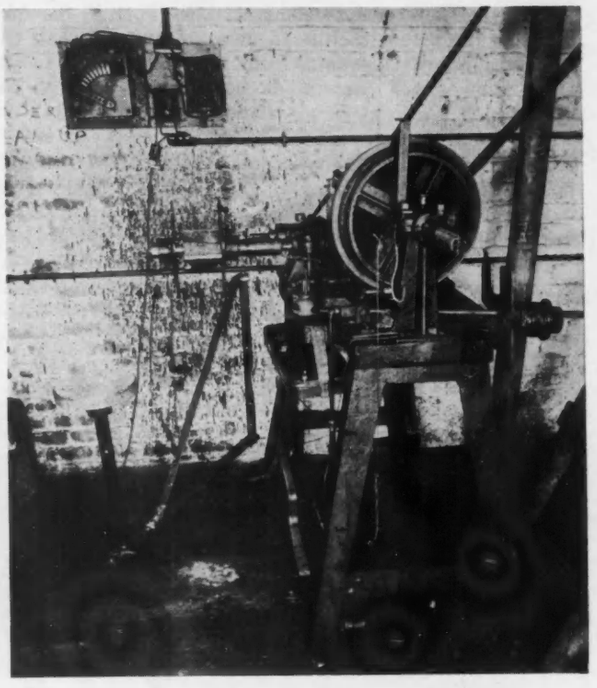
(*e*) Effect of correction on distribution losses within the plant.

5. Finally, it must be borne in mind that favorable power factor and voltage conditions can be best obtained by the intelligent selection of motor sizes, types and speeds. When this method is combined with a properly balanced distribution system there will usually be but little requirement for specific power factor correction.

For Twenty Years and More

WHEN the coil winding machine pictured above was first designed and built by Horace Adams of the Farnsworth Electrical Works, San Francisco, there was no slow-speed winder available on the market, particularly for heavy transformer coils and large motors. Hence came the design and building of this unit, which has proved in 20 years of service to be sound and effective.

The winder is driven by a back-geared motor through a cone pulley equipped with a friction clutch. Speed is further reduced through the medium of a worm gear and a pair of spur gears which terminate in two winding spindles running at different speeds. The machine is also



equipped with a self-acting brake, gravity operated by means of weights, which stops the winding instantly and prevents overwinding.

Forms are made of wood split-sections held between two plates on a demountable shaft keyed to the end of one of the winding spindles. These split forms are cut at an angle so that the end thrust of the nut holding the plates against the form drives them outward against the dowels which hold them together for positive location.

A swinging seat, attached to the wall, is a handy adjunct to this lathe. Still greater flexibility of speed is given by means of the rheostat control of the motor speed.

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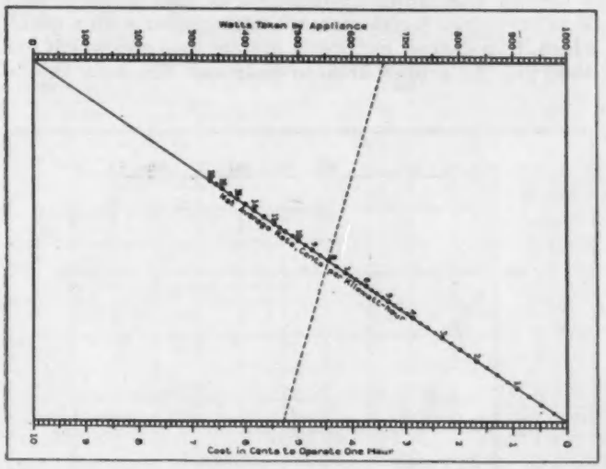
AMONG THE LINES which can be carried with profit by motor dealers is the portable blower. This small motor-driven device has its advantages over compressed air supply in many cases in that the air blown from it contains no moisture. Another advantage is that it can also be used as a suction machine for a wide variety of work. Many dealers find this a profitable side line and some even rent such equipment to industrial plants.



Handy Chart Determines Operation Costs

TO DETERMINE the cost of operating an electric motor or appliance, the above chart is a guide. To use this chart, lay a ruler on the figure representing wattage of motor or appliance and also on the rate per kilowatt-hour. Where the ruler crosses the right-hand line may be read in cents the cost of operation for one hour. For ratings greater than 1,000 watts, use 1,000 and multiply the result by the ratio of actual watts to 1,000. Chart prepared by Iowa State College, distributed by General Electric Company.

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Use Motor as Brake

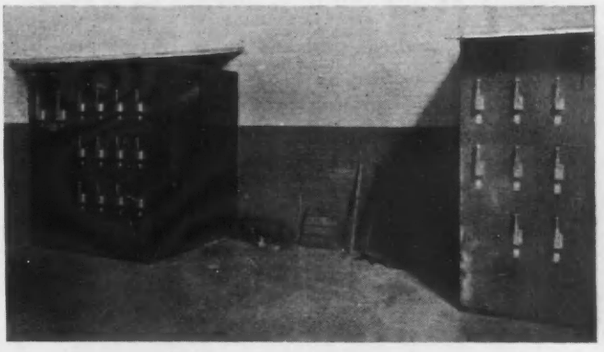
PECULIAR problems are frequent occurrences to the motor specialist. Many tax his ingenuity and determine his ability to serve the public and the industry to better advantage.

Backstrand Bros., motor specialists of Riverside, Calif., were called in on a peculiar problem at San Bernardino not long ago. A construction company manufacturing spun concrete pipe 60 in. in diameter and three sections at a time, to supply a pipe line between San Bernardino and Riverside, was having difficulty in stopping the revolving of the mechanism after the pipe had been sufficiently spun. A total weight of 18 tons was being revolved, which when in motion and the power shut off from the 40-hp. motor, caused an unusual situation. This 18-ton mass was being speeded up from 140 r.p.m. to 600 r.p.m. through a Reeves speed changer of the cone type. With the power turned off, the rotor speed of the motor ran up from 15,000 to 16,000 r.p.m. At this speed the rotor whistled like a siren and after a short period of operation the centrifugal force threw the rings and bars completely out of the motor.

Backstrand Bros., after testing the speeds, made a suggestion that the power be left on the line to act as a brake against the revolving mass. The motor thus would act as a generator against the line, would save on the energy cost, and would slow down the revolving mass more quickly. Incidentally, it would save the replacement of the motor at approximately two- or three-week intervals.

Housing Protects Switchboards From Moisture and Debris

IN ANY location where there is danger of moisture or of debris of any kind falling in the back of a switchboard the plan used in the installation at the Pacific Paper Products Corporation in Los Angeles by the Quality Electric Works will be found of benefit. As shown in the illustration, a metal roofing was placed over the switchboard so that nothing could fall behind it. Likewise a door and wall were run back to the building wall as shown in the illustration. In this instance each section of the board was placed at the end of a wall space, leaving an



Metal roof and wall placed around switchboards in Los Angeles plant prevent debris falling in back

empty space in the center for future additions as may be required.

Service to these boards is provided by means of buses running through the rear wall of the plant to a transformer yard directly behind it. This transformer yard is enclosed in wire mesh and is in effect an outdoor substation. The method of making taps to the transformer is shown in the lower illustration.

Taps to transformers are run through apertures in wall as shown

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"BUSINESS EFFICIENCY," says Dr. Julius Klein, Assistant Secretary of Commerce, "may be furthered by improving stock records and devising some method of inventory control; using or developing better trained personnel; improving collection policies; organizing delivery methods, eliminating excessive delivery costs; curbing the mania for gross sales; improving and simplifying accounting methods; store layouts; . . . and keeping better records and studying them."

Engineering

What to Build— Steam or Hydro Plants?

HERE is presented a method of analysis that has proved to be useful in guiding the determination of the related economic factors which dictate the proportions in which steam plants and hydro plants should be built to serve growing load in order to realize maximum over-all system economy

By A. H. MARKWART

Vice-President, Pacific Gas and Electric Company

TO ILLUSTRATE a method of determining the economic position of hydro and steam in the light of present-day hydro development costs, and fuel-electric costs and economies, the accompanying three charts are presented and discussed. Figs. 1 and 2 show groups of curves depicting the annual cost per kilowatt of generating plant capacity expressed in terms of energy delivered at primary substations. These curves apply to a system similar to that of the Pacific Gas and Electric Company and are computed for different percentages of peak carried on steam.

These curves have the general form of the economic curves commonly used in all engineering studies of any magnitude. Application of these economic curves to the analysis of power systems, however, is of some particular interest to the electric utilities of the West. The analytical method is general and may be applied to any system but, for convenience, the specific example given is for California conditions and particularly those of the Pacific Gas and Electric Company.

In the study of any system certain basic information is necessary as follows:

1. Characteristic of the system load.

(*a*) Load factor from peak and from base for different percentages of system peak.

(*b*) Kilowatt-hours on peak and base for different percentages of system peak.

2. Characteristics of hydro supply.

(*a*) Normal deficiency.

(*b*) Dry-year deficiency.

3. Annual charges on hydro, including operation, maintenance, depreciation, return on investment, etc., but excluding taxes, expressed in percentages. (Taxes are excluded because in California the State taxes are a percentage of the gross income.)

4. Similar charges for steam, not including fuel.

5. Fuel economies and cost.

6. Capital cost of steam plant to primary substations.

7. Capital cost of hydro plant to primary substations.

In Fig. 3 is shown a tabulation of data based upon a 60 per cent load factor system load, together with a graph which, to a degree, pictures a system load and which has under it the proper area to bear out the data in the tabulation. The curve in question was prepared from the daily load charts of the Pacific Gas and Electric Company for the year 1926. In its preparation the half-hourly loads for the 365 days of the year, expressed in per cent of the annual peak, were assembled in the order of their magnitude.

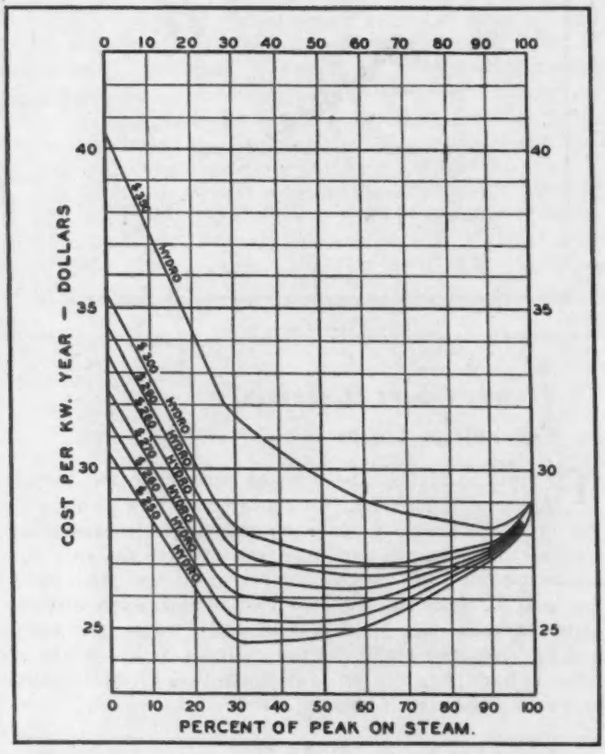


Fig. 1. Cost per kilowatt-year of 60 per cent load factor power delivered at primary substations from a combined steam and hydro system where oil or its equivalent prevails at 75 cents per barrel and hydro capital ranges from $250 to $350 per kilowatt of delivered peak

These percentages then were arranged in descending order from midnight to 3 a.m., ascending from 3 a.m. to 10 a.m., descending from 10 a.m. to 12:30 p.m., ascending from 12:30 p.m. to 5:30 p.m., and descending from 5:30 p.m. to midnight. This was done to obtain a curve of a composite system load which would have a shape similar to a possible system load curve and yet have under it at any percentage of peak an area which would correctly represent the percentage of kilowatt-hours in the peak from which the other necessary factors could be obtained.

Half-hourly percentages of load could just as well have been assembled directly in the order of their magnitudes, either ascending or descending, without affecting the tabulated figures. The arrangement elected was merely to obtain a "picture" of the composite system load. The change points chosen were the hours at which important features of the Pacific Gas and Electric load occur. For example, the system minimum for 1926 occurred at 3 a.m. while the peak occurred at 5:30 p.m., intermediate changes representing the usual midday fluctuation in load.

TABLE I—Analysis of a combined system with 1-kw. system load with 60 per cent annual load factor, 5,260 kw.-hr. Dry-year hydro deficiency 50 per cent, average hydro deficiency 12 per cent.

Item												
	Steam kw.	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
	Hydro kw.	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00
1.	Hydro load factor	60.00	66.60	74.00	80.60	85.90	91.20	96.60	99.60	100.00	100.00	.....
2.	Steam load factor	.....	3.50	5.80	13.10	22.00	29.50	36.10	43.50	50.40	55.90	60.00
3.	Hydro kw.-hr. (per cent)	100.00	99.40	98.10	93.50	85.40	75.60	64.10	49.50	33.10	16.60	0.00
4.	Steam kw.-hr. (per cent)	0.00	0.60	1.90	6.50	14.60	24.40	35.90	50.50	66.90	83.40	100.00
5.	Base kw.-hr. (hydro)	5,260.00	5,228.00	5,160.00	4,918.00	4,492.00	3,976.00	3,372.00	2,604.00	1,741.00	873.00	0.00
6.	Peak kw.-hr. (steam)	0.00	32.00	100.00	342.00	768.00	1,284.00	1,888.00	2,656.00	3,519.00	4,387.00	5,260.00
7.	Dry-year deficiency in kw.-hr. (per cent)	50.00	49.70	49.00	46.80	42.70	.....	.....	.....	.....	.....	.....
8.	Steam kw. on base to make up dry-year deficiency	0.30	0.30	0.295	.....	.....	.....	.....	.....	.....	.....	.....
9.	Reserve steam kw. (25% of peak steam)	0.00	0.025	0.05	0.075	0.10	0.125	0.15	0.175	0.20	0.225	0.25
10.	Total steam kw.	0.30	0.325	0.345	0.375	0.50	0.625	0.75	0.875	1.00	1.125	1.25
11.	Steam kw.-hr. for dry yr. (12% hydro)	631.00	627.00	619.00	590.00	539.00	477.00	405.00	312.00	209.00	105.00	0.00
12.	Steam kw.-hr. transmission loss (1%)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	53.00
13.	Steam kw.-hr. for station uses (5%)	32.00	33.00	36.00	47.00	65.00	88.00	115.00	148.00	186.00	225.00	266.00
14.	Total steam kw.-hr.	663.00	692.00	755.00	979.00	1,372.00	1,849.00	2,408.00	3,116.00	3,914.00	4,717.00	5,579.00

In developing the curves of Figs. 1 and 2 the data in Fig. 3 were applied to a system load of 1 kw. at 60 per cent load factor at primary substations. The load was considered as carried by different percentages of steam on the peak, varying by 10 per cent increments from 10 to 100 per cent. Based upon operating experience the hydro deficiency in kilowatt-hours was taken as 12 per cent on the average and 50 per cent for a maximum deficiency in the driest years. It was assumed that on dry years the peak would be carried by hydro with base load carried by steam.

Obviously with dry-year deficiencies of such magnitude (which may obtain in California) the condition of zero per cent of steam on the peak is purely theoretical since at least 30 per cent of system capacity in steam installation as a provision for emergency supply is necessary in order to carry the load. In the set-up made it was assumed that steam installation would be provided to make up hydro deficiency in all cases. A reserve of 25 per cent in installation was allowed for on peak steam. Station uses were taken as 5 per cent of the steam kilowatt-hours generated. For 100 per cent steam a transmission loss of 1 per cent was added to cover the relatively low percentage of kilowatt-hours which would have to be transmitted long distances from steam plants to outlying points in a regional system.

Computing Steam Quotas

Table I shows the calculations involved to determine steam installation and steam kilowatt-hours required to support a "mingled" steam-and-hydro system of one kilowatt at 60 per cent load factor.

Item 1 shows the hydro load factor where various percentages of peak are on steam. This was taken from Fig. 3. For example, with 50 per cent steam on the peak, the hydro load factor is 91.2 per cent.

Item 2 is the steam load factor, likewise taken from Fig. 3 and which, for 50 per cent steam on the peak, is 29.5 per cent.

Items 3 and 4 are the percentages of hydro and steam kilowatt-hours respectively. These are taken from Fig. 3 and, for the case of 50 per cent steam on the peak, are 75.6 per cent and 24.4 per cent respectively.

Item 5 represents the kilowatt-hours supplied by hydro in a total load of one kilowatt at 60 per cent load factor or 5,260 kw.-hr. It is equal to 5,260 times the percentage given in Item 3. For 50 per cent of the peak on steam, 3,976 kw.-hr. would be on hydro.

Item 6 gives the kilowatt-hours carried by steam, or 5,260 less than on hydro.

Item 7 is the percentage of hydro kilowatt-hours in the load which is to be supplied by steam on a dry year on the basis that the deficiency is uniform throughout the year. This is 50 per cent of the hydro percentage in Item 3.

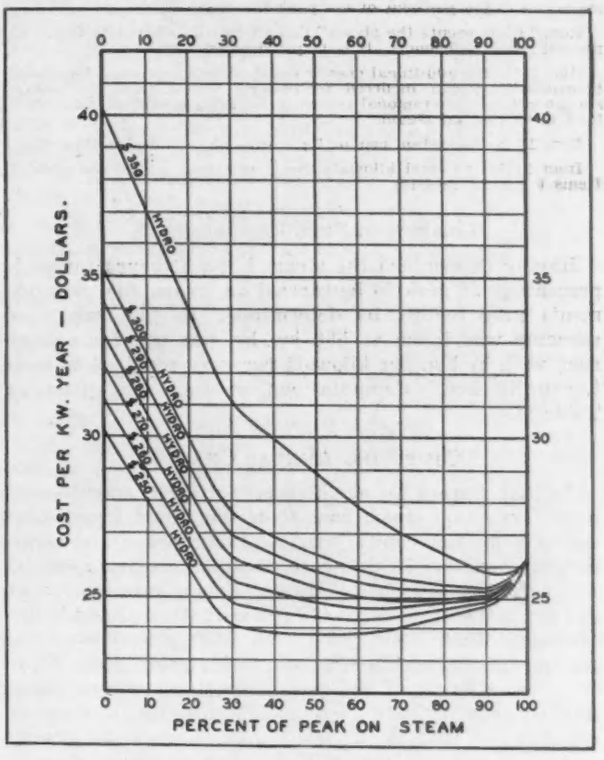


Fig. 2. Cost per kilowatt-year of 60 per cent load factor power delivered at primary substations from a combined steam and hydro system where oil or its equivalent prevails at $1 per barrel and hydro capital ranges from $250 to $350 per kilowatt of delivered peak

Item 8 is the installation required to produce the percentage of kilowatt-hours of Item 7 when used on the base.

Item 9 is the reserve installation required. It is 25 per cent of the peak steam.

Item 10 is the total steam installation. It is the sum of Items 8 and 9 where dry-year steam installation is greater than the peak

TABLE II—Fuel requirements for a 1-kw. system load with 60 per cent annual load factor, 5,260 kw.-hr. Dry-year hydro deficiency 50 per cent, average hydro deficiency 12 per cent.

Item												
	Steam kw.	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
	Hydro kw.	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00
1.	Total steam kw.-hr.	663.00	692.00	755.00	979.00	1,372.00	1,849.00	2,408.00	3,116.00	3,914.00	4,717.00	5,579.00
2.	Fuel required (bbl.) ¾ bbl. per kw. for no-load standby	0.225	0.244	0.259	0.281	0.375	0.469	0.562	0.656	0.75	0.843	0.938
3.	Fuel for energy—550 kw.-hr. per bbl.	1.205	1.258	1.373	1.78	2.495	3.362	4.378	5.665	7.116	8.576	10.144
4.	Total Fuel	1.43	1.50	1.63	2.06	2.87	3.83	4.94	6.32	7.87	9.42	11.08

TABLE III—Annual charges for a combined system with a 1-kw. system load with 60 per cent annual load factor, 5,260 kw.-hr. Dry-year hydro deficiency 50 per cent, average hydro deficiency 12 per cent.

Item	Steam kw. / Hydro kw.	0.00 / 1.00	0.10 / 0.90	0.20 / 0.80	0.30 / 0.70	0.40 / 0.60	0.50 / 0.50	0.60 / 0.40	0.70 / 0.30	0.80 / 0.20	0.90 / 0.10	1.00 / 0.00
Annual Charges for Steam only												
1. Capital, operation, maintenance and depreciation taken at 13½%		4.05	4.39	4.66	5.06	6.75	8.44	10.12	11.81	13.50	15.19	16.88
2. Steam transmission ($10 per kw. at 10%)		....	....	....	....	....	.....	.....	.....	.....	.....	1.00
3. Fuel (75 cents per bbl.)		1.07	1.12	1.22	1.54	2.15	2.88	3.71	4.74	5.90	7.07	8.31
4. Fuel ($1 per bbl.)		1.43	1.50	1.63	2.06	2.87	3.83	4.94	6.32	7.87	9.42	11.08
5. Total steam charges (75 cent oil)		5.12	5.51	5.88	6.60	8.90	11.32	13.83	16.55	19.40	22.26	26.19
6. Total steam charges ($1 oil)		5.48	5.89	6.29	7.12	9.62	12.27	15.06	18.13	21.37	24.61	28.96
Total Annual Charges (Including 10% for hydro capital, operation, maintenance and depreciation.)												
7. 75 cent oil with $250 hydro		30.12	28.01	25.88	24.10	23.90	23.82	23.83	24.05	24.40	24.76	26.19
8. 75 cent oil with $300 hydro		35.12	32.51	29.88	27.60	26.90	26.32	25.83	25.55	25.40	25.26	26.19
9. 75 cent oil with $350 hydro		40.12	37.01	33.88	31.10	29.90	28.82	27.83	27.05	26.40	25.76	26.19
10. 75 cent oil with $400 hydro		45.12	41.51	37.88	34.60	32.90	31.32	29.83	28.55	27.40	26.26	26.19
11. $1 oil with $250 hydro		30.48	28.39	26.29	24.62	24.62	24.77	25.06	25.63	26.37	27.11	28.96
12. $1 oil with $300 hydro		35.48	32.89	30.29	28.12	27.62	27.27	27.06	27.13	27.37	27.61	28.96
13. $1 oil with $350 hydro		40.48	37.39	34.29	31.62	30.62	29.77	29.06	28.63	28.37	28.11	28.96
14. $1 oil with $400 hydro		45.48	41.89	38.29	35.12	33.62	32.27	31.06	30.13	29.37	28.61	28.96

installation. Where peak installation is greater, the steam installation is 125 per cent of the peak installation.

Item 11 represents the steam kilowatt-hours required to make up normal hydro deficiency. It is 12 per cent of Item 5.

Item 12 is the additional energy required to compensate for added transmission losses incurred in sending power from the steam station out into the regional system when 100 per cent of the system load is carried on steam.

Item 13 is the station use, or 5 per cent of Item 6 plus Item 12.

Item 14 is the total kilowatt-hours on steam. It is the sum of Items 6, 11, 12, and 13.

Computing Fuel Requirements

Having determined the steam kilowatt-hours for each percentage of peak to be carried on steam, fuel requirements may readily be determined. In this case fuel economy was taken as 550 kw.-hr. per bbl. for energy fuel, with ¾ bbl. per kilowatt per year required to keep the units hot. Computations of fuel are given in Table II.

Computing Annual Charges

Annual charges for one kilowatt for each percentage of peak carried on steam consist of the steam installation and transmission capital charges, fuel charges, and hydro capital charges. In this case, steam installation capital was taken at $100 per kilowatt, steam transmission at $10 per kilowatt of load (100 per cent steam), and hydro capital at $250, $300, $350, and $400 per kilowatt including transmission and primary substation costs. While the quoted figure of $10 per kilowatt for steam transmission capacity seems low at first thought, it must be remembered that it is based upon a regional system where the bulk of load is in the area relatively close to the source of steam-electric energy as compared with hydro transmission distances. Of course, in a wholly metropolitan area there would be no transmission at all.

Annual charges of 13½ per cent on steam plant capital were used, including operation, maintenance, and depreciation. Annual charges on hydro and transmission capital were taken at 10 per cent. Fuel was taken at 75 cents and $1 per bbl. and separate groups of curves were prepared, Fig. 1 for 75 per cent oil and Fig. 2 for $1 oil. Table III shows the computation involved.

All of the factors involved in the foregoing can be determined for any system with a fair degree of accuracy. The resulting groups of curves (Figs. 1 and 2) provide a guide in the programming of development work to meet growth in load or in analyzing an existing system.

Method Widely Applicable

Take, for example, the consideration of additional power supply where estimates show the cost of delivered hydro peak to be $350 per kilowatt, where the prevailing price for fuel oil or its equivalent is 75 cents per barrel, and where other factors are the same as in the foregoing discussion. The economics of the situation will be revealed by Fig. 1, wherein the $350 hydro curve shows that steam capacity in excess of 90 per cent of the total capacity to be added is needed. Thus, the hydro under consideration must represent less than 10 per cent of the total new capacity if the load demand is to be met at the best over-all economy. In this case it would be better to meet growth in load with 100 per cent steam. Were the hydro to cost $250 per kilowatt of peak delivered, the hydro could be employed to meet from 60 per cent to 50

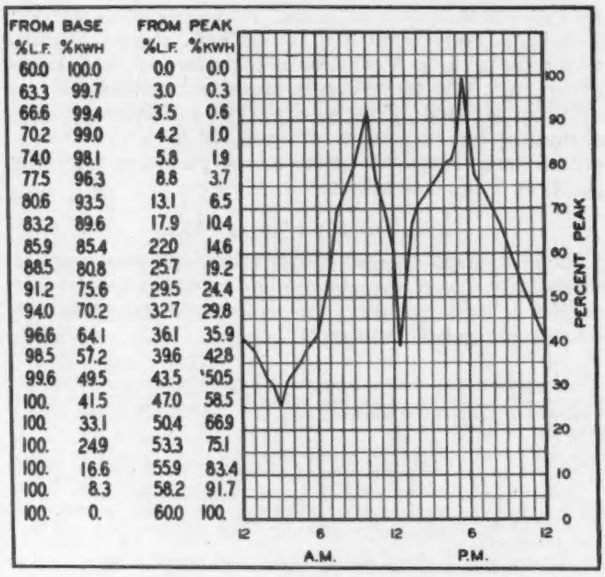


Fig. 3. Composite yearly load curve made up from 365 daily load curves of a 60 per cent load factor system, expressed in per cent of system peak

per cent of the load. In this case it would be better first to install steam in the amount of, say, 40 per cent of the expected total requirement (hydro plus steam) and when that is absorbed by load growth, then to bring in the hydro.

Where an existing system is under consideration and analysis of existing capacity shows a cost of $350 per kilowatt delivered and existing hydro represents, say, 30 per cent of the system load, growth of load should

be met entirely by steam until the major portion of the system load is carried by steam.

Byproduct Hydro of Little Value

In general this method shows that with stream-flow conditions as they are in California, a minimum of 30 per cent of system generating capacity is needed in steam-electric stations to provide for dry years regardless of the cheapness of hydro supply. Further, it shows that with low fuel prices which now obtain, only the cheapest hydro can be developed if maximum system economy is the goal.

Principles involved in this analysis are applicable to any system where hydro and steam are employed jointly in meeting the load. It must be remembered that the hydro under discussion is that capable of meeting the peak demand at all times. Stream-flow hydro and irrigation development byproduct hydro distinctly are not in this class and power from such variable sources has a value equal only to the cost of additional fuel required to generate equivalent steam kilowatt-hours in plants already constructed.

Load Factor of Prime Importance

Another economic factor of importance that is emphasized is that hydro must be "load-factored" correctly to suit the system load in which it is to be employed and where it represents a certain definite percentage of the system peak as determined by the economical proportions of hydro and steam. Where large percentages of steam are to be employed in meeting a system load, such as the one discussed herein, hydro load factors must be relatively high. For instance, in the case of any given hydro plant, it might be physically possible to add a generating unit at a relatively low cost per kilowatt of installed capacity. However, if such an additional unit brings the hydro plant load factor down below the load factor required to effect an economic balance with steam capacity, the unit is not justified at any cost.

Economic studies of energy cost, therefore, must be based upon hydro plant capacity *at the proper load factor* if such studies are to be at all helpful.

Editor's Note. At least three other published articles reflect further the philosophy underlying Mr. Markwart's analytical method; two of them go into much greater detail:

1. "Why Steam in California?" Electrical West, Aug. 1, 1930, pp. 62-65.

2. "Pumped-Storage Hydro-Electric Plants," by A. H. Markwart, *Proceedings of the American Society of Civil Engineers*, August, 1929, pp. 1617-1637.

3. "Power in California," by A. H. Markwart, *Journal of The Franklin Institute*, August, 1927, pp. 145-192.

One-Man Framing Jack Obviates Injuries

By Sydney W. Green
San Joaquin Light & Power Corporation, Fresno, Calif.

Out of an investigation started two years ago by the San Joaquin Light & Power Corporation central accident prevention committee to determine the cause of so many cases of strained backs among linemen of the company, was born the one-man framing jack, an appliance for lifting poles from the ground while the cross-arms and hardware are being attached. Investigation showed that lifting heavy poles from the ground to the X-shaped framing jack preliminary to framing caused most of the injuries. As a rule, too few men were available to lift the pole easily onto the jack.

The new machine, called a "one-man" framing jack because with its use one man can raise a pole weighing 2,000 lb. 22 in. in 30 sec., is built of a cast steel frame with a milled worm pinion and a half-segment drive wheel. The gear ratio is 20 to 1.

Its operation is simple. The tail of the base and lift are made somewhat flat and thin which makes it possible to slip the ends any place under a pole where the clearance is ½ in. or more. A handle equipped with a reversible ratchet is slipped onto the drive shaft and the jack is ready to lift. With a few strokes of the ratchet lever the pole is raised to the desired height for work. On the lifting arm is a sliding stop which may be adjusted to poles of large or small diameter.

The base of the gin is 36 in. long and 5 in. wide, and provides ample support for heavy poles even on damp ground. It is sufficiently long to prevent the pole rolling or toppling over where irregular ground surfaces are encountered. In fact, so solid is the pole on this jack that two men could not upset the pole shown in the picture.

After a four-months' test, the central accident prevention committee has approved the jack and an order has been placed for one on each line truck.

The machine was originally the idea of Dan C. Quinlivan, formerly a line foreman and now salesman for the Valley Electrical Supply Company. It was later engineered by C. E. Schnell and E. W. Otto. The test model was made by Dale Glenn in the company's machine shop.

A new framing jack which weighs less than 50 lb. and can be worked easily by one man. The jack is slid under the pole, which is lifted by means of the ratchet gear. When in an elevated position, the pole is so stationary that two men cannot push it over or roll it

Reactive Kva. Metering—II

Additional Methods of Securing Phase Shift Required for Single-Phase Reactive Kva. Measurement

By E. C. GOODALE
Tacoma, Washington

ANOTHER method of securing a voltage (e_1) 90 deg. leading another (e), as for the voltage coil of a single-phase reactive meter, is to connect a capacity impedance in series with the meter's voltage coil. This connection is good only for those cases wherein the voltage coil is highly inductive, as in an induction type of instrument. For resistance-type potential elements, as in the electrodynamometer instruments, an inductive reactance (preferably in parallel with the voltage coil) also is necessary. This was discussed in the preceding article.

For correct reactive metering, a 90-deg. lagging voltage is desired but the same effect may be secured by obtaining a 90-deg. leading voltage and then reversing the winding (or leads) of the voltage coil of the meter.

In Fig. 6 is shown a reactive wattmeter or watthour meter connected into a circuit with a capacity impedance in series with it. Resistor and capacitor are shown in series with each other. Inasmuch as no condenser is an

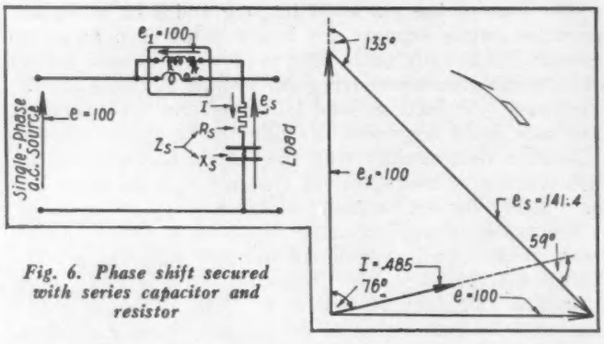


Fig. 6. Phase shift secured with series capacitor and resistor

absolutely pure capacity reactance because of the slight leakage, the leakage resistance is indicated as shown within the condenser.

In the vector diagram of Fig. 6 the relations of all the quantities indicated by the direction arrows on the connection diagram are shown. By scaling the vector diagram it may be found that the "residual" voltage, e_s, across the series impedance must be 141.4 volts if e and e_1 are 100 volts each as indicated. With the coil impedance made up of a resistance of 50 ohms and an inductive reactance of 200 ohms, the impedance becomes $Z = \sqrt{50^2 + 200^2} = 206$ ohms. Consequently, with

$$e_1 = 100 \text{ volts, the current } I = \frac{100}{206} = 0.485 \text{ amp.}$$

This same current flows through the series impedance Z_s. Therefore $Z_s = \frac{141.4}{0.485} = 290$ ohms. The angle by which the current I must lag the voltage e_1 is one whose cosine is $\frac{50}{206} = 0.243$. This angle is 76 deg. Hence current I, which lags e_1 by 76 deg. must be 135 —76 =59 deg. ahead of residual voltage e_s (since e_s lags e_1 by 135 deg.)

Proportions of the impedance Z_s evidently must be such that its power-factor angle will be 59 deg. lead. This means that the condenser must have a reactance $X_C = 290 \times \sin 59 \text{ deg.} = 290 \times 0.86 = 250$ ohms. Total resistance (including what is in the condenser) must be $R = 290 \times \text{cosine } 59 \text{ deg.} = 290 \times 0.51 = 148$ ohms. A condenser of 250 ohms capacity reactance would, at 60 cycles, have a capacity C =

$$\frac{1}{2 \times 3.1416 \times 60 \times 250} = 0.000{,}010{,}62 \text{ farad, or } 10.62 \text{ mf.}$$

If desired, a parallel combination of resistance and capacitance could be used, as illustrated in Fig. 7. The general effect of such a combination as compared with

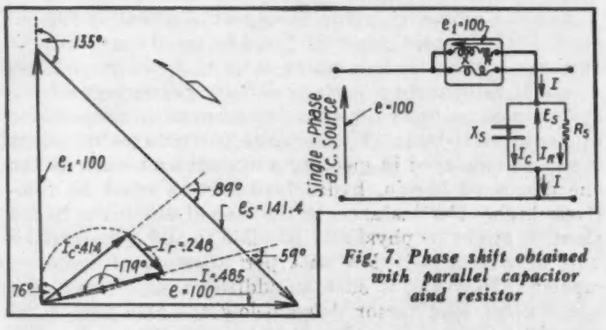


Fig. 7. Phase shift obtained with parallel capacitor and resistor

the series combination will be to increase the reactance of the parts, hence decreasing the capacity of the condenser required, but increasing the resistance of the resistor required.

Vector relations existing between all of the electrical quantities shown on the connection diagram of Fig. 7 are shown on the related vector diagram. Determination of the proper values of capacity reactance and resistance required to give the same equivalent impedance as in the preceding case is a bit more difficult, but may be understood by a careful study of the vector diagram of Fig. 7.

Current I is to be the same as before, but is to divide vectorially into two parts, I_C through the condenser and I_R through the resistor. Assuming a condenser with a power-factor angle of 89 deg. lead, this will mean that I_C must be 89 deg. ahead of e_s, and I_R must be in phase with e_s. Hence these two parts must be (vectorially) 89 deg. apart. Consequently, if a segment of a circle of $2 \times 89 = 178$ deg. be constructed on I as a chord and then I_R and I_C are drawn at their proper relations with e_s (I_C leading by 89 deg. and I_R in phase) to form a triangle with I (this triangle being inclosed by the arc of the circle) it will be found that by scaling the vectors I_C and I_R their true and required values may be obtained. In this case I_C is 0.414 amp. and I_R is 0.248 amp.

The corresponding resistance will be

$$R_s = \frac{141.4}{0.248} = 570 \text{ ohms.}$$

The capacity reactance will be $X_C = 141.4/0.414 = 342$ ohms. Included in this 342 ohms are the internal resist-

ance of the condenser which for a power-factor angle of 89 deg. amounts to about 6 ohms. Due to the large angle (nearly 90 deg.) the true capacity reactance will be very nearly 342 as calculated.

A capacity reactance of 342 ohms at 60 cycles corresponds to a condenser

$$\text{of } \frac{1}{2 \times 3.1416 \times 60 \times 342} = 7.76 \text{ mf.}$$

In these various cases as discussed for single-phase reactive metering, the voltages obtained will be correct as long as circuit conditions remain unchanged. That is, as long as no impedance of any kind is added to or taken away from the circuit of the voltage coil and its auxiliary impedance. For instance, if a voltmeter were to be connected across the impedance in order to measure e_s, circuit conditions would be altered and the true 90-deg. relation no longer would exist until the voltmeter was removed. Of course, the higher the impedance of any such parallel device the less the change would be.

For this reason the phase shifts obtained by means of added impedance are relatively unstable as compared with those secured by transformation from two or more different phases, as is possible with the polyphase reactive meters to be described in succeeding articles.

EDITOR'S NOTE: The third article of this series will appear in an early issue of ELECTRICAL WEST and will treat the subject of two-phase three-wire and four-wire reactive metering.

▼ ▼ ▼

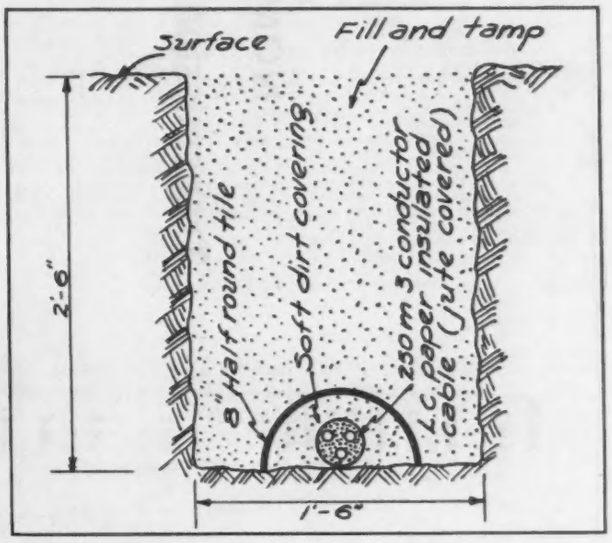
Protect Trench-Laid Cable Without Use of Ducts

By J. F. SODERSTROM
Distribution Department, Puget Sound Power & Light Company

MECHANICAL protection for a trench-laid cable without the use of duct has been accomplished satisfactorily by the Puget Sound Power & Light Company. In laying 2,000 ft. of three-conductor, 250,000-circ.mil cable across the University of Washington campus in Seattle, open-trench construction was used and protection afforded against outside disturbances through the use of semi-cylindrical 8-in. concrete tile, as indicated in the accompanying illustrations.

Affording ample protection without duct installation, inexpensive semi-cylindrical concrete tile was laid over 2,000 ft. of three-conductor cable in a trench on the University of Washington campus

Cable with insulation consisting of 7/32 x 7/32 in. of impregnated wood-pulp paper covered with lead sheath and tarred jute, was received in 500-ft. lengths and was pulled into a 2½-ft. trench from two directions by means of tractors. Dollies spaced approximately 10 ft. apart



in the trench expedited the pulling. The cable when in place was covered with a thin layer of dirt, and the half-round tile paced over it. Backfilling then was completed and solidly tamped. With this method of construction, the only expense incurred over the cost of ordinary trench lay was the relatively inexpensive tile. Manholes and ducts were completely eliminated.

The work was instituted at the request of University officials that a 13-kv. overhead line installed in 1927 to serve the campus be placed underground where the overhead construction obstructed the marine and mountain view for which the campus is noted.

▼ ▼ ▼

Welding Attracts Attention

Interest in welding and its allied equipment and methods was demonstrated by the heavy attendance at a recent conference held at Oregon State College, Corvallis. Sponsored by the industrial arts department of the college, the second annual welding conference was attended by more than 100 contractors, builders, architects, and service men.

KULMANN
NOMOGRAPHS
FOR
Transmission Line Characteristics
No. 10
Surge Admittance
√Y/Z
Capacity Susceptance—Micromhos per Mile
Surge Admittance—√Y/Z
Surge Admittance Phase Angle—Degrees (Plus)
Impedance—Ohms per Mile
Impedance Phase Angle—Degrees

Transmission Line Nomographs

No. 10—Offers Graphical Solution for Obtaining Numerical Value of Surge Admittance in Second Term of Current-Characteristic Equation

By C. ALBERT KULMANN
Pelton Water Wheel Company, San Francisco

THIS, the tenth of the series of nomographs for determining the characteristics of transmission lines, is the first of two charts necessary to determine graphically the second term of the current-characteristic equation:

$$I_1 = I_0 \text{Cosh } Vl + E_0 W \text{ Sinh } Vl$$

where I_1 is the generator current, I_0 is the load current, E_0 is the load voltage, V is the hyperbolic angle of one mile of line, l is the line length in miles, and W is the surge admittance of the line, being the square root of the result of dividing the line admittance by the impedance. All of these quantities except l are vector quantities, the angles being measured with respect to E_0, the load voltage.

Of the three factors of the second term, E_0 is, of course, a given value and Sinh Vl was determined by means of chart No. 7 (ELECTRICAL WEST, Oct. 1, 1929) while W is evaluated by means of the accompanying nomograph. This last quantity, defined above, depends upon the left-hand graph portion of chart No. 4 (ELECTRICAL WEST, May 1, 1929) for finding the impedance and upon No. 3 (ELECTRICAL WEST, March 1, 1929) for the determination of admittance, this being taken as equal to the capacity susceptance which, for all practical purposes, is true.

In using the accompanying nomograph, locate the correct value of impedance in ohms per mile on its scale, and that for capacity susceptance in micromhos per mile on its scale. Connect these points with a straight-edge and read on the surge admittance magnitude scale the value of that quantity. Next locate the point corresponding to the impedance phase angle and connect this with the point marked 90 deg. on the capacity susceptance scale, and read surge admittance phase angle, which completes the evaluation of this vector quantity.

EXAMPLE

To illustrate the use of the nomograph, assume values of 6 micromhos per mile capacity susceptance, 0.16 ohm per mile resistance, and 0.6 ohm per mile inductive reactance. By means of chart No. 4 the impedance for these values of resistance and inductive reactance is found to be 0.62 ohm, with a phase angle of 75 deg. Locate the value of impedance on its scale, and that of capacity susceptance on its scale, connect these with a straight-edge, and read the surge admittance magnitude as 0.00312.

Next, take the scale point corresponding to 75 deg. impedance phase angle and connect this with the 90-deg. point on the capacity susceptance scale, and read the surge admittance phase angle as 7½ deg. Thus the vector quantity, surge admittance, appearing in the equation as W or $\sqrt{Y/Z}$, is fully evaluated as to magnitude and angle.

New Books

PROBLEMS IN PUBLIC UTILITY MANAGEMENT, by Philip Cabot and Deane W. Malott, respectively professor and assistant professor of public utility management, Graduate School of Business Administration, Harvard University. Cloth bound; 6 x 9 in.; 632 pages, illustrated. Second revised edition. Published 1930 by McGraw-Hill Book Company, Inc., New York For sale by book department, McGraw-Hill Company of California, 883 Mission St., San Francisco. Price $6.—This is fundamentally a textbook of public utility economics. Its subject matter is presented in a most useful form, a form which educators call the "case method." Thus this treatment is at once sufficiently fundamental to give it authority and sufficiently flexible to make it readily applicable. The authors consider that the laws which govern business cannot be taught because they are not yet known, but that the student of business can be armed against the unknown by being taught how to meet it when it comes. No two business problems are alike, but the authors believe that business problems can be grouped and distributed into categories subject to a method of diagnosis similar to that used in medical practice. The problems presented have been carefully selected upon the basis of teaching experience and are presented in four divisions according to general subject matter: Characteristics of a Public Utility, Valuation, Depreciation and Fair Return, Marketing and Finance. They have been prepared from printed reports of court and commission decisions and from information supplied by public utility officers. Each of the divisions has a separate introduction, outlining the principles which the authors consider to be supported by the cases presented in that division.

HANDBOOK OF CHEMISTRY AND PHYSICS, by Charles D. Hodgman, M.S., and Norbert A. Lange, Ph.D., respectively associate professor of physics and assistant professor of organic chemistry, Case School of Applied Science, Cincinnati, Ohio. Flexible fabricoid binding; 4 x 6½ in.; 1,386 pages. Fourteenth edition. Published 1930 by Chemical Rubber Publishing Company, Cleveland, Ohio. Price $5.—This is a ready-reference, pocket-size handbook of chemical and physical data which includes material on many branches of chemistry, physics, and closely allied sciences. In the interest of wide usage, the authors have attempted to include all chemical and physical data which they consider likely to find any extended use, and in the interest of retaining convenient size and moderate dimensions, they have excluded material useful only in highly specialized lines of work. The contents are divided into fifteen major divisions: Mathematical Tables, General Chemical Tables, Properties of Matter, Heat, Hygrometric and Barometric Tables, Sound, Electricity and Magnetism. Light, Miscellaneous Tables, Definitions and Formulae, Laboratory Arts and Recipes. Photographic Formulae, Measures and Units, Wire Tables, and Problems. An appreciable amount of new material is included in this edition.

ELECTRICITY FOR BEGINNERS, by Edward Harper Thomas. Cloth-bound; 4 x 6½ in.; 172 pages; 28 illustrations. Second edition, revised and enlarged. Published 1930 by the Norman W. Henley Publishing Company, New York, N. Y. Price $1.50—This is an elementary work on electricity written in simple, non-technical language for the beginner. The manuscript originally was prepared for manual training classes in grade schools. Fundamental principles are explained simply and from a practical viewpoint. Subject matter is divided into 55 chapters, each of which is designed to serve as a lesson assignment.

ELECTRIC TESTING SIMPLIFIED, by H. H. Cross, teacher of electrical trades at the Sydney Technical College, Australia. Cloth bound; 5 x 7 in.; 186 pages; 103 illustrations. Published 1930 by Crosby, Lockwood & Son, London. Price $1.25.—This manual is one of the Lockwood series of practical handbooks. It is designed for the electrician, or the practical student, to whom a simple explanation of basic fundamental principles would be of particular use. Care has been taken to interpret technical statements into simple and readily understandable conversational language. Many practical suggestions are included.

HIGH VOLTAGE OIL CIRCUIT BREAKERS, by Roy Wilkins and E. A. Crellin, respectively consulting engineer, Pacific Electric Manufacturing Company, San Francisco, and assistant engineer, division of hydro-electric and transmission engineering, Pacific Gas and Electric Company, San Francisco. Cloth bound; 6 x 9 in.; 301 pages; 121 illustrations. First edition. Published 1930 by McGraw-Hill Book Company, Inc., New York. Price $4. For sale by Book Department, McGraw-Hill Company of California, 883 Mission St., San Francisco.—In this volume is presented an extremely comprehensive discussion of that most important item on the electric transmission and distributing system—the oil circuit breaker. The authors devote some space and attention to and record accurately the early history of this piece of equipment. Arc suppression, absorption of the energy of the arc and electric circuit characteristics are touched upon as important factors influencing the design and application of oil circuit breakers. A particularly comprehensive collection of authentic information concerning modern high-voltage breakers is presented. This particular section presents many technical data. Of some particular interest are the included results of actual field tests conducted by the authors under system operating conditions. This book fills a long felt need and should prove of definite value to the engineer and to the student of electrical engineering.

News

P. G. and E. Company Absorbing Mass of Great Western Personnel

PERSONNEL changes resulting from the merger of the Great Western Power Company and the San Joaquin Light & Power Corporation with the Pacific Gas and Electric Company gradually are being effected.

Announcement already has been made of the appointment of A. Emory Wishon, formerly vice-president and general manager of the Great Western Power Company and the San Joaquin Light & Power Corporation, as vice-president and assistant general manager of the Pacific Gas and Electric Company. Mr. Wishon also has been elected president of the San Joaquin company and the Midland Counties Public Service Corporation, succeeding his father, A. G. Wishon, who has been made vice-chairman of the board of directors of the two companies.

The most extensive adjustments involved in the merger affect former officials and employees of the Great Western Power Company, which is being absorbed into the Pacific Gas and Electric system. The San Joaquin and Midland Counties Corporation will remain autonomous, and very few changes are being made in the personnel of those organizations.

A. M. Frost, former general sales manager of the North American Company subsidiaries and newly elected president of the Pacific Coast Electrical Association, is now associated with the general office sales department of the Pacific Gas and Electric Company.

Al C. Joy, formerly publicity director for the Great Western and San Joaquin companies, has been appointed publicity manager for the Pacific Gas and Electric Company, and in this capacity will be in charge of all publicity and advertising activities of the combined companies. J. Charles Jordan, formerly manager of the publicity department of the Pacific Gas and Electric Company, has been made assistant manager of the reorganized publicity department.

R. A. Sharon, formerly assistant to the vice-president and general manager, now is associated with the department of public relations and sales headed by R. E. Fisher.

J. S. Moulton, formerly executive engineer of the Great Western Power Company, now is attached to the Pacific Gas and Electric Company's executive offices as assistant to Mr. Wishon.

W. G. B. Euler, formerly general superintendent, has been named engineer of operation of the Pacific Gas and Electric Company's gas and electric properties for the San Francisco and East Bay Divisions of the company. G. H. Hagar and C. F. Benham, formerly assistants to the general superintendent, will be associated with Mr. Euler as before.

J. A. Koontz, formerly electrical engineer, will be associated with J. P. Jollyman, chief of the division of hydro-electric and transmission engineering, as an assistant engineer.

F. W. Smith and F. R. Sherwood, formerly purchasing agent and assistant purchasing agent, respectively, have been transferred to the purchasing department of the Pacific Gas and Electric Company.

G. W. Bernhard, formerly industrial heating engineer; J. W. Wrenn, formerly manager of appliance sales; and R. L. Eltringham, formerly special agent, have joined the general office sales department.

Other changes include A. M. Mardel, C. P. Vetter, D. J. Fraser, and L. P. Cornell, who are now affiliated with the division of civil engineering under I. C. Steel; J. W. F. Armstrong, who is now in the division of electric distribution and steam engineering; W. H. Spaulding, who has joined the legal department; and Howard Jones, who has become a member of the commercial department staff, reporting to N. R. Sutherland.

The entire Great Western Power sales force has been absorbed into the sales organization of the Pacific Gas and Electric Company, salesmen having been transferred to the Pacific Gas and Electric local offices of the districts in which they formerly were employed.

The major part of the Great Western general office force has been transferred to Pacific Gas and Electric departments. In the adjustment, primary consideration was given to employees of both companies who had a long record of service, and the few cuts that were made affected only persons who had been with the organizations a short time.

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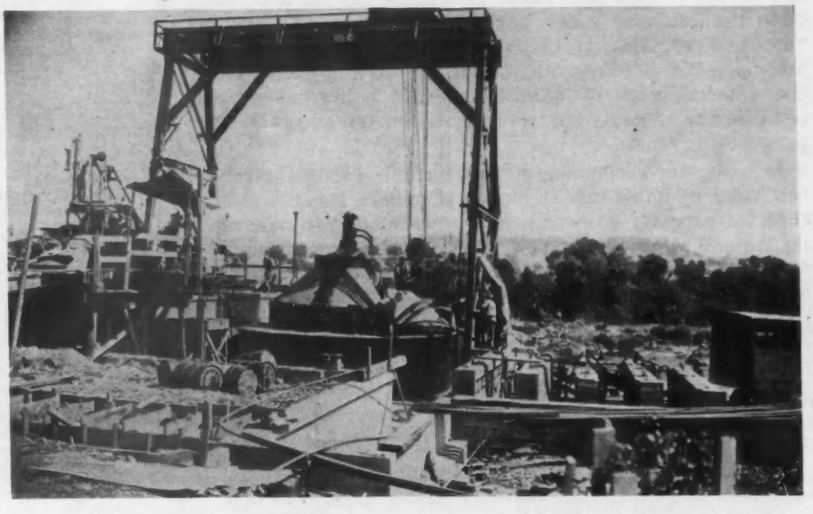
Outdoor Generating Unit at Merced Falls Plant



CONSTRUCTION of a 4,580-hp. outdoor generating unit at the Merced Falls plant of the San Joaquin Light & Power Corporation, Fresno, Calif., has been completed, operating tests made, and the generating unit placed on the line. This unit replaces two 225-kw. Bullock generators, which have been in service for 27 years.

The illustration shows half of a 21-piece welded steel hood being installed to protect the generator from the elements. The usual power house has been dispensed with in this, the first installation of its type in California.

The height of the dam has been increased 1 ft. and the thickness 3½ ft. on the downstream face, which raised the level of the pond 6 ft. above the old level. The reconstruction is being done at an approximate cost of $330,000.

An interesting feature of this plant is the fishway that is to be constructed across the tailrace with the upper end at the crest of the dam.

The fish ladder will consist of fifteen pools, each 6 ft. wide, 8 ft. long and 3 ft. deep. The length of the spillway is 3 ft. and the drop from pool to pool will be 2 ft. The total climb or rise from the tailwater to pond level is 32 ft. The intake to the fish ladder is provided with removable boards to provide for slight changes in pond level.

$64,000,000 Will Be Spent in Oregon on Twenty-Year Hydro Development Plan

IN COMPLETING initial arrangements for the promotion of its twenty-year development plan in southern Oregon, The California Oregon Power Company has filed seven separate applications with the Oregon state engineer for authority to appropriate 3,385 sec.-ft. of water from the North Umpqua River and five applications for permits to appropriate 7,500 sec.-ft. from the Klamath River. According to the tentative descriptions which accompanied the applications, the company contemplates the development of approximately 188,661 hp. on the North Umpqua and 245,420 hp. on the Klamath River, at an estimated total cost of $57,150,000.

According to information in the office of the state engineer, the utility has already received a preliminary permit from the Federal Power Commission for right-of-way over government lands and all that remains for the operator to close the legal negotiations with the federal authorities will be the filing of an application for a license to use government properties in the construction of the various hydro-electric plants, dams, canals, and other structures. Upon the granting of this license, the state engineer has said, it will be mandatory on the part of the state to grant the power rights applications unless it is found in so doing that the proposed developments will interfere with some public welfare projects, a contingency not probable, in the state engineer's opinion.

Partial descriptions of the contemplated projects, as given in the applications, are as follows:

UMPQUA RIVER DEVELOPMENT

Rock Creek Project—Appropriation of 800 sec.-ft. of water; concrete arch dam 215 ft. high and 1,350 ft. long; tunnel 4,800 ft.; fall 221.5 ft.; 20,136 hp.; estimated cost, $8,700,000.

Clearwater Project No. 1—Appropriation of 150 sec.-ft. of water; concrete slab and rock dam 20 ft. high and 350 ft. long; canal and pipe line 34,000 ft.; fall 555 ft.; 10,091 hp.; estimated cost, $1,500,000.

Clearwater Project No. 2—Appropriation of 235 sec.-ft. of water; pipe lines and canals 33,500 ft.; concrete arch dam 53 ft. high and 230 ft. long; fall 875 ft.; 23,366 hp.; estimated cost, $2,100,000.

Lemolo Project No. 1—Appropriation of 400 sec.-ft. of water; rock fill and concrete slab dam 60 ft. high and 430 ft. long; pipe lines and canals 38,600 ft.; 775-ft. fall; 35,227 hp.; estimated cost, $3,500,000.

Lemolo Project No. 2—Appropriation of 400 sec.-ft. of water, simple masonry dam; tunnels, pipe lines and canals 19,200 ft.; fall 750 ft.; 34,091 hp.; estimated cost, $2,100,000.

Tonketee Project—Appropriation of 600 sec.-ft. of water; concrete spillway dam with rock fill ends; tunnel 27,600 ft.; fall 715 ft.; 48,750 hp.; estimated cost, $6,500,000.

Boundary Project—Appropriation of 800 sec.-ft. of water; concrete arch dam 220 ft. high and 480 ft. long; tunnel and penstock 2,600 ft.; fall 137 ft.; 17,000 hp.; estimated cost, $5,350,000.

KLAMATH RIVER DEVELOPMENT

Five different points of diversion are proposed along the stream from the Grant power site to the California-Oregon line, a distance of fifteen miles. At these diversion points the following developments are included in the company's plan: (1) utilizing a 200-ft. fall to develop 34,091 hp.; estimated cost $4,000,000; (2) 214-ft. fall to develop 36,477 hp.; estimated cost $4,500,000; (3) 384-ft. fall to develop 65,455 hp.; estimated cost $5,500,000; (4) 100-ft. fall to develop 17,045 hp.; estimated cost, $2,600,000; (5) 166-ft. fall to develop 22,295 hp.; estimated cost, $4,000,000.

The company has already completed its application for a permit to develop 70,057 hp. at the so-called "Grant" power site on the Klamath, the application calling for the appropriation of 1,500 sec.-ft. of water which will be utilized in a fall of 411 ft. The development of the project will involve the expenditure of approximately $7,000,000 under a plan whereby a first development will be completed in five years and the full development within twenty years.

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Frank T. Post Succeeds to Presidency of The Washington Water Power Company

AT A MEETING of the board of trustees of The Washington Water Power Company, Spokane, held in New York on Aug. 4, Frank T. Post was elected president of the company to succeed the late D. L. Huntington, who died last September. J. E. E. Royer was elected general manager, succeeding Miles W. Birkett, whose death occurred last June, and R. B. Childs was made assistant general manager. All three of the officers are residents of Spokane.

FRANK T. POST

J. E. E. ROYER

R. B. CHILDS

Mr. Post, who has been chief counsel of The Washington Water Power Company since 1909 and vice-president since 1926, has handled many of the executive duties of the company since Mr. Huntington's death. Mr. Post arrived in Spokane in 1889, the year of the incorporation of the company, and he is the fourth to hold the position of president in the 41 years of the company's existence. He is the senior member of the law firm of Post & Russell and will continue to maintain his connection with that firm.

Mr. Royer, who has been assistant general manager since Nov. 1, 1924, has been acting general manager since the death of Mr. Birkett. He went to Spokane from Columbus, Ohio, in October, 1917, to enter the employ of the power company. His first work was in the construction department and later he was assigned to the operating department. On Aug. 1, 1919, he was made assistant superintendent of light and power, a position which he held until he became assistant general manager.

Mr. Childs has been associated with the company as a commercial engineer since 1923. Prior to that he was in the employ of the Montana Power Company. During the World War he served as a captain in the 363rd Infantry of the 91st Division.

California Assn. to Study Radio Interference

Following a two-day conference of radio engineers and trouble men held recently in Fresno, Calif., a statewide organization to be known as the California Radio Interference Association, was formed for the purpose of exchanging information about radio interference and remedies, thus co-ordinating the efforts of interference experts and others who have been studying radio noises.

During the sessions the following papers were read and discussed: "Handling of Complaints," by George H. Curtis, secretary, Pacific Radio Trade Association, San Francisco; "Dealer Installation and Responsibility," by Leslie Joost, Inspector, Oakland; "Grounds," by C. M. Lindsley, radio interference engineer, The Southern Sierras Power Company, Riverside; "Filters and Their Application," by F. W. Thomas, Jobe-Deutschman Company, manufacturers, Pasadena; "Education of the Public in Regard to Interference," by G. R. Walters, interference engineer, Radio and Music Trades Association, Los Angeles; "Ordinances and Ordinance Enforcement," by M. W. Jacobs, interference engineer for Pacific Coast Radio Trades Association, Sacramento, and G. R. Walters, Los Angeles; "Certification of Service Men," by G. R. Walters, Los Angeles; "Utility Responsibility," by Don Ray, manager, public relations department, Pacific Gas and Electric Company, San Francisco; "Coupling and Whose Responsibility?" by F. B. Doolittle, radio engineer, Southern California Edison Company, Ltd., Los Angeles; "Interference From Primary Lines From 2,300 to 20,000 Volts," by N. E. Borch, radio engineer, Radio Trades Association, San Francisco; "Interference From High Lines 20,000 Volts and Up," by C. C. Campbell, Pacific Gas and Electric Company, San Francisco; "Voltage Fluctuation," by N. E. Borch, San Francisco; "Street Railway Interference," by L. E. Dye, Los Angeles Railway, Los Angeles; "Theory of Interference," by Mr. Babcock, Southern Pacific Company, Oakland.

For the next meeting the subject selected was "Methods and Equipment for Tracing Interference," each paper to combine the experiences of those who actually come in contact with interference as investigators, and to cover the following four important points: (1) How do you go about tracing interference? (2) What do you use to trace it with? (3) How do you arrive at your conclusions? (4) What do you do to correct it?

Among the proposed activities of the association will be the formation of committees to carry on tests to solve radio interference and to consider complaints originating with radio listeners, especially in sections where no local organization is in existence.

G. R. Walters, interference engineer of the Radio and Music Trades Association of Los Angeles, was chosen as president of the California Radio Interference Association, and George H. Curtis, secretary of the Pacific Radio Trade Association, San Francisco, is secretary. Permanent officers are to be elected at a meeting to be held later in the year.

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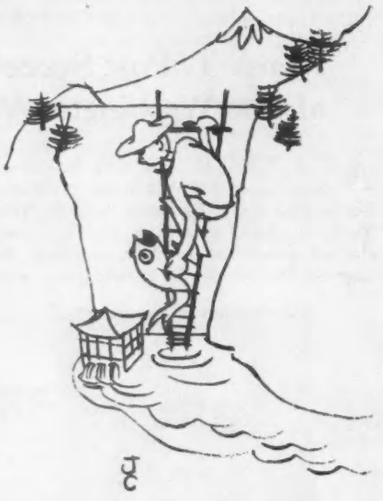
Fishing a Problem in Japan Also

Hazards to fish life created by the damming of rivers for water power development are not confined to our own Northwest states. The following item,



quoted from a recent issue of *Denki-notomo*, describes Japanese experiments with the electric fish screen and fish ladder:

"The prevalence of water power development has created a growing conflict with the fishery on the rivers. The fishermen on the Hitaka River made a severe petition to the authorities on the fact that the six power plants on the river made the going up of fishes, especially of trout, diminutive although fish ladders are provided. The authorities are experimenting to lead the fishes up the ladder by providing electric screens under the dam so that the fishes are forced to travel up the ladder instead of gathering under the dam. If the experiment proves effective it will clear the difficulty to a great extent."

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NEW LINE WILL EXTEND CANADIAN SYSTEM—At a cost of $120,000 the West Canadian Hydro-Electric Corporation, Vernon, B. C., is building a 20-mile high-tension transmission line, which will extend its system to include the communities of Winfield, Oyama and Okanagan Centre.

Los Angles Power Bonds Held for November Vote

By vote of the Los Angeles Board of Water and Power Commissioners the proposed $19,000,000 bond issue to defray the expenses of a three-year construction program for power development will be placed on the ballot of the general election to be held Nov. 4, instead of on the ballot of the primary election to be held Aug. 26, as had originally been proposed. The Board's recent action definitely postpones the bond election to the later date. For the construction proposed $31,000,000 will be required, but of that amount $12,000,000 is to be derived from power revenues.

Major items of the $31,000,000 construction program and their cost include: Two small power plants with a total capacity of 9,100 kw. in Owens Valley and a 222-mile, 110-kv., steel-tower transmission line, $4,885,000; a 14,000-kw. third unit in plant No. 2 on the aqueduct, $925,000; additions and improvements to present generation and transmission system within the city, $3,725,000; new line and receiving substation, $3,075,000; additions to city distribution system, largely preparatory to distribution of Boulder Canyon power, $14,665,000; general equipment, warehouse and shops, $1,200,000; Boulder Canyon transmission rights-of-way and attendant engineering, $2,525,000.

The committee consisting of A. V. Guillou, assistant chief engineer of the California Railroad Commission, W. F. Durand, emeritus professor of mechanical engineering, Stanford University, and R. W. Sorensen, professor of electrical engineering, California Institute of Technology, which was retained by the Chamber of Commerce to investigate and report upon the proposed power program, has filed its report, and the board of directors of the chamber is expected to make its recommendations at an early date.

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New Line to Connect Nephi and Delta, Utah

Definite decision to construct a new 44-kv. transmission line from a connection just north of Nephi, Utah, to Delta, Utah, has been announced by H. B. Waters, general manager, Telluride Power Company. The line, which will tie in with the high voltage of the Utah Power & Light and the Telluride companies' lines running from Santaquin south into Sanpete County, will cross the Utah state highway about two miles north of Nephi. The line will be built in a southwesterly directoin to Rocky Ford, Leamington, and Lynndyl, and the connection at Delta will be made with the Telluride power line at that point.

The construction of the new line is expected to result in much better service, the old line having traversed mountainous territory in which at times it was difficult to maintain good service.

Arizona Expected to Fight Boulder Dam Project

That Arizona will fight the Boulder Dam project to the bitter end now seems certain despite rumors to the contrary, according to recent press despatches. K. B. Pederson, attorney general of Arizona, stated while in Washington early last month that suit would be filed before the next session of the United States Supreme Court on grounds of unconstitutionality. The contracts signed by the Interior Department will provide insufficient funds to finance the project as required by law, said Mr. Pederson as one of his main arguments. The comptroller general has been asked to rule against further expenditures for construction preliminaries till federal funds are more fully safeguarded. Arizona is retaining the Washington law firm of Covington, Burling, and Rublee in its case.

Interior Secretary Ray Lyman Wilbur tended to minimize the legal consequences in a speech made while on his recent visit to the Pacific Coast, saying: "Some legal obstacles are still to be expected but when two Congresses and two Presidents have acted on the matter, it will be pretty hard to stay the hand of government by judicial action." Dr. Wilbur pointed out that the formation of the Los Angeles power and light department into a commercial organization with corporate responsibility was instrumental in the acceptance of a contract which assures project financing.

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New Lines Will Serve Two Idaho Districts

Construction of 32 miles of 110-kv. transmission line to extend from Garfield, Wash., to Lewiston, Idaho, is to be started shortly by The Washington Water Power Company, according to an announcement by J. E. E. Royer, newly appointed general manager.

From Garfield to Pullman, Wash., the new line will replace a 60-kv. line, and from Moscow, Idaho, to Lewiston it will replace a 22-kv. line. Part of the new line will be of single-pole type and part will be of the H-type pole structure.

The new line will make possible the transmission of increased power from the company system to the Lewiston district and will also allow heavier transmission from the Lewiston hydro-electric plant back into the Palouse country of southeastern Washington when necessary. The line being replaced between Garfield and Pullman was built more than twenty years ago. The new line will be built for 110-kv. capacity but will be operated at the outset at 60 kv., it is understood.

The new Coeur d'Alene No. 4 110-kv. transmission line, construction of which was started by The Washington Water Power Company on Jan. 22 of this year, was placed in service June 30 and is now being used in furnishing electric service to the great Coeur d'Alene mining districts. The new line replaces Coeur d'Alene No. 2 line, which was constructed in 1906.

The new No. 4 line is 65 miles long, from the East Side substation at Spokane to its terminus at Kellogg, Idaho. It is of double-pole, H-type structure. The right-of-way extended east from the East Side substation following a line of foothills and thence turning northeast of Coeur d'Alene and on to Kellogg.

Caterpillar tractors were used extensively in the line construction work, which presented many difficulties because of the hilly character of the terrain. Four of these tractors were used in moving poles into position, hoisting poles and pulling wire.

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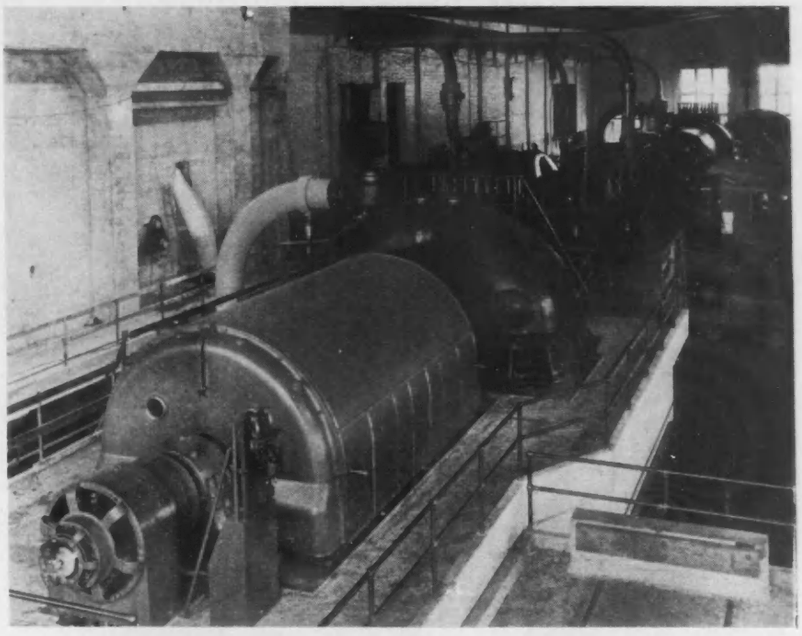
GRAYS HARBOR COMPANY BUYS OLYMPIC PENINSULA UTILITY — The Grays Harbor Railway & Light Company, Aberdeen, Wash., has purchased the Forks Electric Company at Forks, on the upper Olympic Peninsula, according to J. R. Snider, vice-president and general manager of the Grays Harbor utility. Under terms of the purchase, the Aberdeen company will take over the plant, equipment and transmission system of the Forks company at once, and will install additional power and generating equipment at the Diesel plant.



Sixth Unit Added to Portland Steam Station

INCREASED steam generating capacity on the system of the Pacific Northwest Public Service Company, Portland, has gone into service during the past month with the completion of this 35,000-kw., 11,000-volt, 60-cycle, 1,800-r.p.m., General Electric Company turbo-generator. This unit is housed in a new addition to the station L plant of the company where a 2,650-hp. Babcock & Wilcox Stirling boiler was recently installed.

The addition of the new generator brings the total installed generator capacity of the station up to 77,500 kw. in six units. Some of the smaller and older units are little used, however, and the station capacity, based upon its boiler capacity, is rated at 63,000 kw.

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Ensenada Gets Power From New 68-Mile Line

Energizing a new 33-kv. line from Tijuana to Ensenada and Maneadero, Mexico, a distance of 68 miles, recently was the occasion for a celebration attended by many Mexican and federal officials and representatives of the San Diego Consolidated Gas & Electric Company and the Southern California Telephone Company.

The line was installed by Cia. Electrica y Telefonica Fronteriza, S. A. (Border Telephone & Light Company), which purchases its power from the San Diego utility for distribution to Tijuana and Agua Caliente, and now to Ensenada.

Governor Jose Tapia of Lower California threw the switch that inaugurated the celebration. In addition to speakers representing the Mexican federal government, A. E. Holloway of the San Diego Consolidated Gas & Electric Company and C. E. Patterson of the Southern California Telephone Company were given prominent places on the program.

The power line, representing an investment of $280,000, not only provides Ensenada with adequate power for the first time, but will also service the elaborate new Playa Ensenada Hotel and casino, to be opened on Labor Day.

R. R. BONNEY
Denver

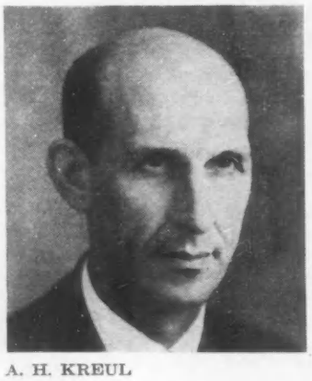
CHARLES E. CAREY
Seattle

L. B. FULLER
Salt Lake City

P. B. GARRETT
San Francisco

LOREN A. TRAUB
Spokane

H. W. HITCHCOCK
Los Angeles



A. H. KREUL
Portland

DR. H. VICKERS
Vancouver

A.I.E.E. Pacific Coast Officials for 1930-31

With the opening of the 1930-31 administrative year of the American Institute of Electrical Engineers on Aug. 1, newly-elected officers and members of the executive committees of the Pacific Coast sections went into office. Sections of the Institute in this territory are maintained at Denver, Los Angeles, Portland, San Francisco, Seattle, Spokane, Salt Lake City, and Vancouver. The officers appointed to have charge of the Institute's affairs in these eight sections for the ensuing year are as follows:

Denver: Chairman—R. B. Bonney, Mountain States Telephone & Telegraph Company; vice-chairman—R. E. Nyswander, University of Denver; secretary-treasurer—Nelson R. Love, Denver Tramway Corporation.

Los Angeles: Chairman—H. W. Hitchcock, Southern California Telephone Company; secretary—Philip S. Biegler, University of Southern California; assistant secretary—F. E. Dellinger, Los Angeles Gas and Electric Corporation; executive committee—J. C. Gaylord, Southern California Edison Company, Ltd.; A. P. Hill, Electrical Research Producas, Inc.; Fred Garrison, General Electric Company; G. A. Riley, Los Angeles Gas and Electric Corporation.

Portland: Chairman—A. H. Kreul, Pacific Northwest Public Service Company; secretary—C. W. Fick, General Electric Company; executive committee—R. J. Cobban, Westinghouse Electric & Manufacturing Company; A. K. Morehouse, The Pacific Telephone and Telegraph Company; H. H. Cake, Pacific States Electric Company.

San Francisco: Chairman—P. B. Garrett, Westinghouse Electric & Manufacturing Company; vice-chairman—G. Ross Henninger, ELECTRICAL WEST; secretary—E. A. Crellin, Pacific Gas and Electric Company; executive committee—J. N. Chamberlin, The Pacific Telephone and Telegraph Company; A. V. Guillou, California Railroad Commission; E. F. Marryatt, Pacific Gas and Electric Company; W. C. Smith, General Electric Company.

Seattle: Chairman — Charles E. Carey, Westinghouse Electric & Manufacturing Company; secretary-treasurer—P. D. Jennings, Puget Sound Power & Light Company; executive committee—C. R. Wallace, General Electric Company; M. T. Crawford, Puget Sound Power & Light Company; T. S. Wood, manufacturers' agent; A. F. Darland, City of Tacoma Utilities

Department; G. L. Hoard, University of Washington.

Spokane: Chairman — Loren A. Traub, Home Telephone and Telegraph Company; vice-chairman—H. L. Vincent, General Electric Company; secretary—Clarence F. Norberg, The Washington Water Power Company; executive committee—Lester R. Gamble, The Washington Water Power Company; G. S. Covey, The Washington Water Power Company; Morgan Allen, Home Telephone and Telegraph Company.

Salt Lake City: Chairman—L. B. Fuller, Utah Power & Light Company; secretary - treasurer — Paul Ransom, Utah Apex Mining Company; executive committee—R. J. Corfield, Utah Copper Company; A. LeRoy Taylor, University of Utah; H. H. Krueger, Utah Power & Light Company; W. B. Clark, General Electric Company.

Vancouver: Chairman—Dr. H. Vickers, University of British Columbia; secretary—C. Arnott, B. C. Electric Railway Company, Ltd.; executive committee—J. Teasdale, B. C. Electric Railway Company, Ltd.; L. B. Stacey, Packard Electric Company, Ltd.; D. Robertson, Canadian General Electric Company, Ltd.

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Cut in Street Lighting Cost Proposed for San Diego

Taxpayers of San Diego will save $17,000 a year if a voluntary reduction in the cost of ornamental street lights proposed by the San Diego Consolidated Gas & Electric Company is affirmed by the California Railroad Commission.

Under the old rate the cost of 600-cp. ornamental lights burning all night was $4.60 per month; the new rate is $3.80. The old cost of 600-cp. lights burning until midnight was $3.20; the new rate is $2.85. The average cost of maintenance of each standard per year is $4.88. The reduction has been accepted by the San Diego City Council.

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Staff Changes Announced By Utah Company

The following changes in personnel, affecting certain of its division offices, have been announced by the Utah Power & Light Company:

E. R. Owen, who has been manager of the company's Logan division for the past seventeen years, has been transferred to the company's general offices at Salt Lake City. Mr. Owen's successor is James A. Bullock, who for the past nine years has been chief clerk of the company's Provo division. The company's Logan division headquarters will be moved from Logan, Utah, to Preston, Idaho, on account of a change in territorial boundaries affecting its Logan and Ogden divisions.

The changes in division managers became effective Aug. 1, and the office change is expected to take place about Sept. 1.

James F. Orr, who has been manager of the Utah Power & Light Company's Ogden division for the past three years, is leaving Sept. 1 to accept a position as commercial manager of the United Gas Corporation, with headquarters at Houston, Texas. Leslie W. Nims, manager of the company's Provo division for the past three years, succeeds Mr. Orr at Ogden. William A. Huckins, who has been sales superintendent of the Ogden division for about ten years, is promoted to the position of manager of the Provo division to succeed Mr. Nims.

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WEST KOOTENAY COMPANY GIVEN SOLE RIGHTS ON PEND OREILLE RIVER—Licenses giving entire rights for development of the Pend Oreille River to the West Kootenay Power & Light Company, Rossland, B. C., have been issued by Major J. C. Macdonald, British Columbia provincial water comptroller. The licenses cover a development consisting of two dams, one at Seven Mile Creek and the other at Cedar Creek. These structures together would harness the flow of the river from the Columbia River to the United States boundary and would develop 175,000 continuous horsepower. The company may, however, decide upon construction of one large dam. Now that the water rights have been definitely allotted, no difficulty is anticipated if plans are changed.

Second Unit Going In at Oak Grove Plant

BY NOVEMBER, at the latest, the Oak Grove (Ore.) plant of the Pacific Northwest Public Service Company will have a second 30,000-kw. unit to supplement the first unit of the same capacity, installed in 1924. Part of the water development for this new unit was completed when the plant was built, but the present pipe line will carry only water enough for a 40,000- or 45,000-kw. output. A new penstock, which may be seen halfway up the hill in the illustration at the left, is being constructed to give sufficient water supply. New building construction may also be seen. Through the trees along the banks of the Clackamas River in the right-hand picture may be seen a tower on the 60-kv. Oak Grove transmission line.

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Award Is Offered for Building Lighting

To promote better illumination of commercial and public buildings, the Agustus D. Curtis award is offered to member companies of the National Electric Light Association. The award will consist of a certificate to the company and $500 to an individual in the company that shows the greatest contribution to commercial electric lighting under the terms of the award.

Contributions, covering either interior or exterior lighting of a building, may be in the form of:

1. Stimulating new and better uses of lighting.
2. A method of lighting that is a distinct advance over present practice.
3. The development of a lighting service activity outstanding in its accomplishments.
4. The promotion of co-operative activities for the betterment of lighting.
5. Relighting the properties of the utility.
6. The elimination of barriers to good lighting.

The contest will include accomplishments realized up to Dec. 31, 1930, and each calendar year thereafter. Exhibits must be filed at National Electric Light Association headquarters on or before April 1 of the year following the period of the contest.

Announcement of the winner will be made at the annual National Electric Light Association convention.

Registration blanks may be secured from the commercial department, National Electric Light Association, 420 Lexington Ave., New York.

Utility Employees Given Bureau of Mines First-Aid Course

FOLLOWING two weeks of intensive study—July 7 to July 21—nearly 500 employees and officials of the Public Service Company of Colorado, Denver, received Department of Commerce cards certifying that they had completed the course of first-aid instruction prescribed by the United States Bureau of Mines.

Throughout this period the divisional Bureau of Mines rescue car was parked on railroad tracks adjacent to the Public Service company's warehouse in West Denver, while Instructors G. M. Kintz, Robert F. Dalrymple and J. Howard Bird conducted classes for three hours each night for the benefit of the utility concern's personnel.

In deviating from its fixed policy of confining its educational efforts exclusively to miners, the Bureau was influenced by the Public Service company's comprehensive safety and first-aid program, and by the argument advanced by A. A. Klinge, manager of safety and claims, that his organization ties in closely with the mining industry by means of electricity.

Attendance at classes was entirely optional, as at those of the regular first-aid course of the Public Service company. Interest manifested by the personnel, from general manager to newly-employed clerks—after working hours, during the hottest season in 56 years—was an indication that the utility's reputation as "emergency surgeon for all Colorado" will be sustained.

Clare N. Stannard, vice-president and general manager, Public Service Company of Colorado, being used as the "victim" for first aid instruction being given by J. Howard Bird (extreme right) and G. M. Kintz, U. S. Bureau of Mines instructors. Dr. Hugh L. Taylor, chief surgeon for the Public Service company, is taking the patient's (?) pulse

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R. H. Ballard Optimistic on Business Trend

"More new business, and not so much talk of depression" was the gist of R. H. Ballard's advice to American business men on his return to Los Angeles last month to take up the duties again of president of the Southern California Edison Company, Ltd., following a three months' European trip. "Spend the money for new business campaigns and more advertising," he said, "and the results will be surprising. The people have the money and will buy goods if somebody has the courage to sell them the buying idea."

As evidence of the ability of consumers to buy goods, Mr. Ballard pointed to the increases in savings deposits, gains in new life insurance in force, and increased buying of bonds. This purchasing power can be tapped, he declared, if American business men will snap out of their apathetic state of mind and employ redoubled efforts to produce new business.

Speaking specifically of his own company, Mr. Ballard said that although operating expenses were lower, the Edison company had increased its new business expenditures 20 per cent over the $1,000,000 expended last year. Mr. Ballard is so certain of the satisfactory results of the new business activities of his company that he predicts 1930 gross and net income will run higher than last year.

Mr. Ballard's chief comment on his European tour, which took him into England, France and Germany, concerned the increasing trend toward stabilization in those countries.

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Administration of Pepco Properties Divided

To facilitate compliance with a recent order of the Oregon Public Service Commission that the power business and street railway business of the Pacific Northwest Public Service Company, Portland, be kept entirely separate, the company proposes to form two subsidiaries for administrative purposes. Under the plan proposed, the Portland General Electric Company will be formed to take over the physical property and franchises covering the power and light and interurban railway operations, and the Portland Traction Company to take over the street railway property and franchises.

In order to effect a transfer of the franchises to these new companies, consent of the City Council through ordinance is necessary, and consideration of the proposition has been asked of the Council.

The formation of the new companies has no interest at the present time for investors since it is proposed to organize them entirely through stock issues of which the parent Pacific Northwest Public Service Company will become the sole owner.

Utility Districts Bill on Oregon Ballot

At the general election to be held Nov. 4 in Oregon a constitutional amendment will be placed before the people providing for the formation of utility districts for "development, distributing, disposal and sale of water, water power, and electric energy." The districts would include "territory which is contiguous or otherwise, within one or more counties, which may include one or more incorporated municipalities, with or without territory outside of such municipalities." The amendment provides that each district shall be under the management of a board of directors consisting of five resident members each.

The present measure, which is declared to be more far-reaching in character than the "Housewives' Bill" defeated in Oregon four years ago, if passed, will give the districts that desire to go into the power business unlimited power to levy taxes, and to sell bonds and other evidence of indebtedness.

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Hook-Up With Seattle City Lines Rejected

The Seattle City Council recently rejected an application of the Great Northern Power Company, serving a large area in Snohomish County, Wash., to hook up its transmission lines with those of the Seattle City Light system at the north city limits.

It was declared that the Great Northern company would be able to obtain electrical energy from the city at one-half cent a kilowatt-hour, barely the cost of production, if the proposed contract were accepted. On the other hand, the Great Northern company's present capacity of production is stated to be inadequate to guarantee the City Light Department any appreciable help in the event of power failures or other emergencies which might curtail the municipal system's output. Under the advantage of the proposed tie-up with the city's vast generating facilities, it was suggested, the small private company would be enabled to oversell its present production possibilities and to do a "land office business" in competition with other private power companies at the expense of the City of Seattle.

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FURTHER DEVELOPMENT OF KOOTENAY RIVER PLANNED—The West Kootenay Power & Light Company, Rossland, B. C., has submitted plans to the British Columbia water controller for the development of 30,000 hp. two miles above Upper Bonnington on the Kootenay River. The company already has two other plants taking power from the Kootenay River, the Lower Bonnington plant giving 60,000 hp. and the Upper Bonnington yielding 30,000 hp., in addition to the 72,000 hp. yielded by the plant at South Slocan. At the same time the company is developing 30,000 hp. on Adams River, east of Kamloops.

Power Bonds Defeated in San Francisco

Voters of San Francisco defeated by a three-to-one vote the four bond propositions for the purchase by the city of the distributing systems of the Pacific Gas and Electric Company and the Great Western Power Company submitted to them at the primary election held Aug. 26.

The four propositions were as follows: (1) Issue of $44,600,000 to purchase the local distributing system of the Pacific Gas and Electric Company; (2) issue of $18,945,000 to purchase the distributing system of the Great Western Power Company; (3) issue of $3,525,000 for necessary connections, substations and stepdown plants; (4) issue of $1,045,000 for construction of Red Mountain Bar power plant.

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Puget Sound Co. Preparing Three-Reel Talkie

Primarily to show the part which the Puget Sound Power & Light Company, Seattle, has played in hydro-electric development in the Northwest, but also to advertise Seattle and Northwest industries, the power company is having made a talking motion picture in which the various phases of the utility's business will be shown and discussed. The sound picture, which will be in three reels, is being produced by Metropolitan Sound Studios, Inc., and generally will show the three primary divisions of the company's hydro-electric activities.

Generation of power, with scenes showing dams, power houses, streams and similar views; transmission of current from generating plants to the distributing centers; utilization of current in industry, homes, and on the farm will be depicted. One section of the sound film will be devoted to the Rock Island hydro-electric development now under construction.

Officials of the Puget Sound Power & Light Company will record explanations of the various scenes as well as discuss the company's various activities in the Northwest. It is planned to exhibit the film, under the direction of Norwood W. Brockett, director of public relations, at luncheon meetings, conventions, and wherever it will prove of interest.

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THE NORTHERN B. C. POWER COMPANY, Prince Rupert, B. C., plans to apply to the British Columbia Provincial Water Board for development rights on the Meziaden River, a tributary of the Naas. The project would supply power to the town of Stewart and adjacent mines. Opposition from fishing interests is expected, the waters affected being important spawning grounds.

NINTH OF "MORE POWER TO THE HOME" SERIES—The Women's committee of the National Electric Light Association has just issued the ninth in its series of booklets entitled "More Power to the Home." The present volume is devoted to miscellaneous electrical household devices. Others in the series are: "Wiring the House," "Better Lighting," "Washing," "Ironing," "Many Motors Make Light Work," "Electric Range Cookery," "Cooking With Small Electrical Appliances," and "Electric Refrigeration."

These booklets are prepared for the use of women's committees in their studies of the application of electricity to housekeeping processes. Many companies also are distributing them to groups interested in Better Homes movements, club women, and instructors and students of home economics. Home service directors are distributing them to groups which attend their classes. Others mail the booklets to selected lists of customers.

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WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, of Tacoma, with a bid of $26,449, submitted the low bid to the Tacoma Board of Contracts and Awards for electrical equipment for municipal steam power plant auxiliary No. 2. The equipment included induction feeder voltage regulators; eleven single-phase outdoor type and three single-phase indoor type.

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Wally Briggs' Annual Kids' Party Carries On

OVER 5,000 youngsters and parents of the Grays Harbor country consumed 730 gallons of icecream and 23,000 cones at the fourth annual "Kids' Party" held at Electric Park, Aberdeen, Wash., by the Grays Harbor Railway & Light Company in July. The announcement of this year's party was one of the first official acts of J. R. Snider, newly elected general manager of the company, to allay juvenile fears that the party might be discontinued because of the death of its founder, Wallace W. Briggs, Mr. Snider's predecessor. This year's party broke all attendance and icecream consumption records.

An "inner tube race" is seen in progress in the left-hand view, and the inset shows Mr. Snider presenting the prize for the diving contest to Peggy Richardson, with W. S. Hill, general superintendent of the company and Mrs. A. R. McMinn, hostess of the pool, in the background.

A feature of the party was the dedication of the ornamental fountain shown in the right-hand picture erected in memory of Mr. Briggs. It carries the following inscription:

"Wally Briggs Swimming Hole
Built
For the Boys and Girls of Grays Harbor
and Dedicated
To Their Happiness
By Wallace Wheaton Briggs,
General Manager, 1929"

Financial

$1,150,000 Spent This Year by Nevada-Calif. Corp.

The associated electrical companies of of the Nevada-California Electric Corporation have expended this year approximately $1,150,000 for construction work throughout the system served, according to announcement of F. O. Dolson, general manager of The Southern Sierras Power Company. This figure includes about $400,000 for the completion of a high-voltage line from San Bernardino to the steam plant of the Los Angeles Gas and Electric Corporation at Seal Beach, which was not included in the $2,000,000 1930 budget. He points out, therefore, that there is yet to be expended $1,250,000 on construction jobs allowed for in the 1930 budget on which work is now under way or yet to be started.

The construction completed thus far this year includes cottages for operators, garages, warehouses, dams, transmission and distribution lines and general work. The largest single item of construction undertaken this year is the resurfacing of the Hillside dam on the south fork of Bishop Creek twenty miles from Bishop. This is a rock-fill dam with timber facing and is being refaced with redwood planking. The total cost will be approximately $100,000.

Expenditures for distribution lines of various voltages from 33,000 down to 110 volts have accounted for $275,000 during the first half of the year, and the greater part of this money has been expended for extensions serving from one to a dozen consumers spread all over the system. About $80,000 has been devoted to such improvements of district lines as reinsulation, increased copper, removing of lines on account of tree interference, and the construction of the Perris-Elsinore 33-kv. tie line, all of which has been done for the betterment of service through improvement of voltage control and better insurance against interruptions. Incidentally, these improvements have also helped to clear up radio interference.

Among the important improvements that have been made has been the reconstruction of the distribution system in Elsinore incident to the construction of a new substation.

The total amount expended this year to date for new substations and improvements to existing substations totals approximately $200,000.

Work under the 1930 budget to be undertaken during the remainder of the year will cost approximately $1,000,000, the expenditure being divided about as follows: Production $50,000, transmission $600,000, distribution $330,000, general $20,000.

The heaviest expenditures for the remainder of the year are in the transmission division; although there are a large number of jobs, three major projects account for more than $600,000. They include the Calipatria-Blythe transmission line to cost $330,000, including a substation at Blythe and station additions at Calipatria. Work will commence on the installation of a 500-kva. synchronous condenser at the El Centro substation about the middle of August and should be completed by the close of the year, to cost about $45,000.

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COMMISSION'S UTILITY FINANCING WORK GROWS—The amunt of public utility financing passed upon by the California Railroad Commission during the fiscal year ended June 30, 1930, showed a sharp increase over the amount acted upon during the year previous, according to a recent report of the commission. During the fiscal year just ended applications for authority to issue securities, and other indebtedness, by public utilities and common carriers operating in California aggregated $315,971,899.44. The commission authorized the issuance of securities amounting to $267,717,330.17. It denied applications involving $1,222,900 of securities, and dismissed from its calendar requests for permission to issue $47,031,669.27 of such securities.

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PACIFIC LIGHTING CORP. INCREASES NET PROFITS—Net profits earned by the Pacific Lighting Corporation, San Francisco, for the twelve months ended June 30, 1930, was $7,641,103 against $7,151,040 earned in the twelve months ended June 30, 1929. The gross revenue for the past twelve months amounted to $48,874,970 and the gross operating expenses, taxes, interest, depreciation and amortization totaled $41,233,865.

The current assets are shown at $19,090,530 and current liabilities at $8,349,572, on the balance sheet dated June 30, 1930, compared with current assets of $15,686,468 and current liabilities of $8,350,808, the previous year.

Investments are shown to have increased from $2,455,563 in 1929 to $6,095,848 in 1930.

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P. G. AND E. CO. TO ISSUE 4½% BONDS—Pacific Gas and Electric Company, San Francisco, has been authorized by the California Railroad Commission to issue and sell on or before Oct. 31, 1930, at not less than 93½ per cent of face value plus accrued interest $25,000,000 of its first and refunding mortgage gold bonds of series "F," dated June 1, 1930, due June 1, 1960, with interest at 4½ per cent per annum, for the purpose of financing in part the cost of additions, extensions, betterments and improvements to its facilities. Arrangements have been made to sell the bonds at 93½ per cent of face value to the National City Company.

EDISON COMPANY SECURITY SALES TOTAL OVER $13,000,000 IN SEVEN MONTHS—A total of $13,703,000 of preferred stocks and bonds was sold by the Southern California Edison Company during the first seven months of the current year. This amount consisted of $11,093,000 of preferred shares and $2,610,000 of bonds, and compares with $14,090,600 sold in the same period of 1929.

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SLIGHT DECREASE IN CALIFORNIA OREGON POWER NET—Net earnings of The California Oregon Power Company for the twelve months ended June 30, 1930, were $2,214,295 as compared with $2,224,022 for the same period in 1929, a decrease of $9,727, or 0.44 per cent. Gross earnings for the year were $3,706,553 as compared with $3,477,004 for the twelve months ended June 30, 1929, an increase of $229,549, or 6.59 per cent.

Northwest Association

President Makes Further Appointments

Additional appointments announced by M. L. Hibbard, president of the Northwest Electric Light & Power Association, since the appearance of the last issue of ELECTRICAL WEST, include the appointment of R. B. King, Idaho Power Company, Boise, to be chairman of the Public Relations Section. Mr. King was chairman of this section during the past administrative year.

A. E. Janssen, also of the Idaho Power Company, has been reappointed treasurer.

P.C.E.A.

MRS. LETCHWORTH AGAIN HEADS WOMEN'S COMMITTEE—Mrs. Nyra G. Letchworth, of the San Joaquin Light & Power Corporation, Fresno, Calif., who served as chairman of the women's committee, P.C.E.A., during the past year, has again been appointed chairman of the committee.

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COMMERCIAL SECTION MEETING DATE CHANGED—Oct. 23-24 are the days on which the Commercial Section, P.C.E.A., will meet in San Francisco. The date for the meeting was announced last month as Oct. 8-9. The conclave will be held at the Fairmont Hotel.

Meetings

Coming Events

American Institute of Electrical Engineers—Annual Pacific Coast convention, Portland, Sept. 2-5, 1930.

Pacific Coast Electrical Association—Commercial Section meeting, San Francisco, Oct. 23-24, 1930.

Engineering Section meeting, San Francisco, Sept. 10-12, 1930.

International Association of Electrical Inspectors, Southwestern Section—Annual convention at Hotel Maryland, Pasadena, Calif., Oct. 6-8, 1930.

National Electric Light Association—Fifty-fourth convention and exhibition, Atlantic City Auditorium and Convention Hall, Atlantic City, N. J., June 8-12, 1931.

Rocky Mountain Division meeting, Franciscan Hotel, Albuquerque, N. M., Oct. 20-22, 1930.

National Electrical Wholesalers Association, Pacific Division—Thrice-yearly convention at Agua Caliente, Mexico, Oct. 8-10, 1930.

Committee to Aid Utility Regulation in California

At a recent meeting of delegates of the League of California Municipalities, a committee of the members was appointed, at the suggestion of Commissioner W. J. Carr of the California Railroad Commission, to develop a plan for assisting the cities and supporting the Railroad Commission in the work of regulating the public utilities of the state.

The members of the committee are as follows: John J. O'Toole, city attorney of San Francisco; Milton Bryan, executive city attorney of Los Angeles; Preston Higgins, city attorney of Oakland; C. H. S. Bidwell, mayor of Sacramento; E. A. Stockburger, city manager of Alhambra; J. D. Peters, city attorney of Chico; R. A. Calin, president of the League of Municipalities of the San Joaquin Valley; and A. B. Fry, member of the Coronado City Council.

W. J. Locke, secretary-manager of the League of California Municipalities, will serve as secretary of the committee.

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COMMITTEES OF I.E.S. APPOINTED—The following committees have been named by W. S. Hanbridge, chairman of the Illuminating Engineering Society, San Francisco, to serve for the ensuing year:

Sustaining Membership—Frank Bevan, chairman; W. W. Hanscon, James Cravath.

Membership — James Mundstock, chairman; C. Huyck, Morris Hixson, N. Hope.

Entertainment—William Cyr, chairman; Frank Bevan, John Maddox, Gilbert Trosper, R. E. Baum.

Program—L. A. Hobbs, chairman; Robert Dummel, Robert Buckles, William P. Bear.

Educational — Clark Baker, chairman; H. Gerber, Leo Gianini, James Cravath.

Oakland—Romaine Myers, chairman; Robert King, James Cravath.

Floodlighting—Sam Russell, chairman; Karl Koch, William Wuelker, D. J. Prudhomme.

Show Window Lighting — Robert Dummel, chairman; R. Myers, Sam Russell, William Wuelker, James Mundstock.

Industrial—Carl Martin, chairman; George Rucker, Miles Steel, Sam Russell, F. E. Carew.

Store Lighting—George Rabb, chairman; Robert St. John, T. Morgan.

Office Building Lighting — G. M. Simonson, chairman; Louis Leurey.

Recreation Grounds — R. Hudson, chairman; N. Graves, Guy King.

Mazda Lamps—Morris Hixson, chairman; W. Carlson, R. Buckles.

Airport Lighting and Street Lighting—William P. Bear, chairman; Ray Conlisk.

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LEAGUE COUNCIL REPRESENTATIVES NAMED—At Camp Co-operation X, the annual conference of the officials of local electrical leagues held at Association Island, Henderson Harbor, N. Y., July 31-Aug. 4, H. H. Courtright, manager, Valley Electrical Supply Company, Fresno, was elected to represent the Pacific Coast on the League Council during the coming year; R. E. Folland, field secretary of the Electrical League of Utah, will represent the Northwest, and J. J. Cooper, General Electric Supply Corporation, Denver, will be the representative from the Rocky Mountain district. G. W. Weston, of Kansas City, is the new chairman of the council. One hundred and sixty delegates participated in the program at Association Island this year.

Personals

Heads San Francisco Area for Westinghouse

W. P. L'HOMMEDIEU

W. P. L'HOMMEDIEU, formerly supervisor of central station sales for the Westinghouse Electric & Manufacturing Company, San Francsico, has been appointed manager of the company's San Francisco office, which has jurisdiction over the San Francisco area.

Immediately following his graduation from Pratt Institute of Technology, Brooklyn, N. Y., in 1906, Mr. L'Hommedieu entered the employ of the Westinghouse company in the East where he remained for four years. In 1910 he joined the company's sales organization in San Francisco. For the past sixteen years he has been in charge of central station sales. He is widely acquainted up and down the Pacific Coast, particularly in California, and has a broad knowledge of the electrical industry and its problems.

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Succeeds R. M. Boykin in Puget Sound Company

LESLIE R. COFFIN, manager of the eastern district of the Puget Sound Power & Light Company and of the Washington Electric Company at Wenatchee, Wash., has been appointed manager of the central district of the Puget Sound company, Seattle, to succeed Richard M. Boykin, who recently resigned to join the executive staff of the Electric Bond & Share Company, New York City.

Mr. Coffin was manager of the Puget Sound company's northern district with headquarters at Bellingham,

LESLIE R. COFFIN

Wash., prior to the war. He left that position to join the Hog Island shipyard organization at Philadelphia. After the war he came to California with Stone & Webster and then started his own business. Several years ago he returned to the service of the Puget Sound Power & Light Company as manager of its eastern district, later becoming manager of the Columbia River development.

Mr. Coffin will be succeeded in Wenatchee by Louis M. Shreve, now sales manager at Wenatchee.

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C. A. DYKSTRA, for three years director of personnel and efficiency of the Los Angeles Department of Water and Power, has been appointed city manager of Cincinnati. Mr. Dykstra has been on the staff of the University of California at Los Angeles as professor of political science.

New President of Los Angeles Electric Club

E. F. WATKINS, purchasing agent of the Southern California Edison Company, Ltd., is the newly elected president of the Los Angeles Electric Club.

A native Californian and a graduate of Santa Clara College, Mr. Watkins has spent his entire business career in southern California. In 1918 he became associated with the Henry E. Huntington interests in connection with the Standard Felt Corporation in

E. F. WATKINS

Alhambra. Five years later he joined the construction department of the Southern California Edison Company, and in 1927 was made purchasing agent.

All matters pertaining to the advancement and development of the electrical industry are of lively interest to Mr. Watkins, and he also is actively interested in the Chamber of Commerce and Purchasing Agents' Association of Los Angeles.

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JOHN T. DUN, formerly an industrial electric heating specialist with the Pacific Gas and Electric Company, San Francisco, has become associated with the Athens Electric Light, Power and Tramway Company, of Athens, Greece, a subsidiary of the European Electric Corporation, Ltd. Mr. Dun's work will be in load building through domestic, commercial and industrial sales.

R. H. THOMSON, who served as Seattle city engineer under a number of administrations prior to 1912, again has been named city engineer to succeed William D. Barkhuff, who was killed in an automobile accident the latter part of July last. The appointment was made by Mayor Frank Edwards and was unanimously confirmed by the City Council. Mr. Thomson is 74 years of age and served as Seattle city engineer from 1892 to 1911. Since leaving the services of the city in 1911 Mr. Thomson has been engaged in private practice as a consulting engineer. He also served one term as Seattle city councilman. The choice of Mr. Thomson by Mayor Edwards was made after long deliberation over a field of a half dozen other candidates.

C. C. PETTET, who since 1925 has been with the Northern Electric Company, at Montreal, as inspection engineer, and in the research products division of the general sales department, has been appointed research products sales specialist for the company at its Vancouver office. Mr. Pettet will work in Vancouver under J. F. Little, district manager, and W. C. Mainwaring, district sales engineer.

JUDSON BIBB, recently with the Mountain States Power Company, Albany, Ore., has resigned to accept a position as manager at Winnemucca, Nev., of the Western States Utilities Company. He succeeds O. R. Mathias, who has joined the Nevada Valleys Power Company, recently acquired by the Sierra Pacific Power Company, Reno, Nev., to manage the Lovelock, Nev., property.

E. M. LINDSAY has joined the staff of the Standard Management and Operating Corporation, San Francisco, and will have charge of construction work on gas plants and distribution systems in addition to acting as supervising engineer on any electrical construction that may be undertaken by the corporation. Mr. Lindsay comes to the West from St. Petersburg, Fla., where he was employed by the Florida Power Corporation as superintendent of distribution. He was formerly a sales engineer for the General Electric Company.

NATHAN C. CLARK, a graduate of the University of California in electrical engineering in 1927, has been appointed instructor in electrical engineering in the College of Engineering of the University of Southern California. Mr. Clark will assist in the general courses in electrical engineering and will have charge, with Professor Philip S. Biegler, head of the department, of the development of high frequency and radio work.

VERNON BROWN, president, Diamond Electrical Manufacturing Company, Ltd., Los Angeles, and vice-president, Square D Electric Company, Detroit, has recently spent several weeks on an extended business trip to Eastern cities.

E. G. REID, of Vancouver, B. C., has been appointed city electrician of Ladysmith, B. C.

M. M. FISHER, treasurer of the Willapa Electric Company, Aberdeen, Wash., has been appointed assistant to the manager of that company. John M. Weir has been named superintendent.

C. M. BREWER, vice-president and general manager, Mountain States Power Company, Medford, Ore., has been honored by the Coos Bay Dredging Company, of Marshfield, Ore., with the christening of one of their tug boats the *C. M. Brewer*. The tug will be used for hauling fuel barges for the power company's steam plant on Coos Bay.

R. B. JOHNSTON, for many years a member of the editorial staff and later of the advertising staff of the *Journal of Commerce*, Seattle, has been appointed director of publicity for the Puget Sound Power & Light Company.

FRED C. FOY has resigned from the publicity department of the San Joaquin Light & Power Corporation, Fresno, to join the publicity department of the San Francisco office of J. Walter Thompson Company, advertising agency. While in Fresno Mr. Foy took an active part in club and civic affairs, serving on Chamber of Commerce committee, the Social Service Commission of the City of Fresno, and for a term as president of the Fresno Advertising Club.

Obituary

GEN. IRVING HALE, a former manager of the General Electric Company in Denver, died in that city July 27 after an illness of several days. General Hale was a first lieutenant of engineers when he resigned from the regular army in 1890 to join the General Electric Company. In 1900 he and other veterans met in the Colorado State House and organized the Veterans of Foreign Wars. The state university conferred on him an LL.D. degree and the Colorado School of Mines awarded him the honorary degree of electrical engineer. General Hale was 68 years of age.

ALLEN HAZEN, a national authority for more than 30 years on hydraulics and water supply, died on July 26 at Miles City, Mont., while returning from the West to his home in New York. Mr. Hazen was engaged several years ago by the Spring Valley Water Company, of San Francisco, as an expert in a rate case in which it was involved. He was regarded as a specialist in water supply problems of the Pacific Coast.

ROBERT M. ADAMS, a former secretary of the Los Angeles Gas and Electric Corporation, died Aug. 12, 1930. He had entered the service of the Los Angeles Gas Company in August, 1889. On Jan. 26, 1910, he was made secretary and treasurer of that corporation, a position which he held until his retirement on May 1, 1916. Mr. Adams had been in ill health for a number of years.

C. G. A. BAKER, former president of the Baker-Joslyn Company, of San Francisco, died in that city on Aug. 16 after an illness of some duration. Upon the sale of the business of the Baker-Joslyn Company to Listenwalter & Gough on April 1, 1929, Mr. Baker retired from the electrical jobbing field after twenty years of activity in it.

Contractor Dealer Inspector

Milwaukee Convention Talks Business

More than at any previous convention in recent years, according to Clyde Chamblin, San Francisco Electragist and member of the executive committee, A.E.I., who represented the Pacific Coast at the convention of the Association of Electragists, International, Milwaukee, Wis., Aug. 18-21, the topics discussed centered upon business development for the electrical contractor.

The modernization movement came in for particular interest because of its success in New York City in the face of the business depression. Discussion of rules for the definition of unfair trade practices for presentation to the Federal Trade Commission were next in interest and importance. The central station merchandising situation likewise came in for official recognition through the passage of a resolution setting in motion an impartial investigation of the entire problem.

Significant was the amendment to the constitution abolishing the union and open-shop sections of the association as being unnecessary distinctions in a business association.

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C. A. ROWLEY, Electragist of Pasadena, was named delegate from the Southern California Chapter of Electragists to the convention of the A.E.I. at Milwaukee in August. He was accompanied by Frank Connolly, executive secretary of the southern chapter.

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THE CLARK ELECTRIC COMPANY, Bellingham, Wash., will occupy a new reinforced concrete building consisting of one story and balcony to be erected for its use at a cost of $10,000.

Modernization Plan Wins Award

For his work in the origination and development of the electrical modernization of industries campaign, as chairman of the National Motor Section Committee of the Association of Electragists, International, Louis Kalischer of Brooklyn, N. Y., was awarded the James H. McGraw Award to Electrical Men, the Contractor-Dealer's Medal for 1930, at the recent convention of the A.E.I. at Milwaukee.

The particular achievement of Mr. Kalischer is described by the citation, which follows in part:

He conceived the possibilities of an electrical modernization movement directed to the 27,000 factories in Greater New York to increase production efficiency, promote economy and improve profits for these manufacturers and also to bring stimulus to the electrical industry by creating additional electrical installation work and profitably employing the resources of the electrical contracting trade at a time when building was slackened. He secured the co-operation of the Electrical Association of New York in sponsoring an Electrical Modernization of Industries Campaign, of which he accepted the chairmanship. He developed a constructive program, organized committee activities embracing 250 electrical men, established headquarters in the five boroughs, guided the preparation of a handbook of modernization, and by the influence of his personal inspiration and enthusiasm and his tireless energy and leadership, marshalled the resources of the industry and co-ordinated the facilities for engineering service, so that all agencies concerned with industrial modernization were focused on the one objective. As a result, business totaling hundreds of thousands of dollars was crystalized to the benefit of all branches of the electrical industry, and particularly the contractor

At the time of his visit to Los Angeles early this year, Mr. Kalischer was interviewed by ELECTRICAL WEST and the theory of his plan resulted in two articles published in the Motor Forum.

New Inspector Named in Stockton

G. J. Schwall, who has been connected for some years with the electrical department of the City of Stockton, was named recently by the City Council of Stockton, Calif., as successor to Frank A. Morrell, popular electrical inspector of that city who died recently.

Mr. Schwall started in the electrical business some twenty years ago as an electrician for the Buzzell Electric Works of San Francisco. Later, after an installation had been made by that firm at the National Paper Box Company of Stockton, in 1919, he became chief electrician for the paper plant.

Two or three years later he entered into business for himself as a motor and industrial contractor in Stockton. This business he sold out seven years ago to enter the employ of the City of Stockton, in charge of the electrical equipment for the city's fire alarm and other civic electrical systems. Mr. Schwall assumed the responsibility upon the death of Mr. Morell in a temporary capacity and was appointed definitely by the Council as chief electrician for the city at a recent meeting.

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THE CROCKETT ELECTRICAL COMPANY, of Crockett, Calif., has been completely rewiring the Armijo Union High School at Fairfield and Suisun, Solano County, Calif. The high school, which was badly damaged by fire last year, is being remodeled and several new units are being added to it. One of the new units is a gymnasium which is well lighted for night sports. Fifteen 300-watt deep-bowl units are mounted for the gymnasium lighting. A Telechron clock system, a radio system and electrical cooking equipment in the domestic science department are some of the other electrical features of the new building.

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ALVA O. JONES was recently appointed city electrical inspector of Denver to succeed E. C. McGrew, resigned.

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Where Everything Is Red Seal Including the Waterfall

Situated at La Playa, overlooking San Diego Bay, the home of A. W. Treadwell, is an all-electric triumph, according to the Ratner Electric Company, who wired it. Ranges, refrigerators, special lighting effects, plate glass mirror switch plates and other refinements of interior equipment were matched outside by the outlets for garden lighting and the waterfalls and pools electrically operated and controlled. Every room is plentifully supplied with convenience outlets in this large Red Seal home.

Municipal Electricians Meet in Denver

Representatives of electrical departments, city electricians, inspectors, superintendents of fire alarm, police, telegraph, and traffic signals, municipal airport lighting and municipal power plants of Canadian and American cities met at the International Association of Municipal Electricians' thirty-fifth annual convention and jubilee held at Denver from Aug. 11 to 15.

The program was broad in character, embracing the functions of city electricians with respect to traffic control, fire and police alarm systems, as well as phases of construction supervised by city electrical departments. Among the speakers from the West were R. S. Cabell, of Denver, who spoke on Neon signs and lighting; William M. Scott, of Salt Lake City, who spoke on the relationship between city electricians, superintendents of police and fire alarm systems and public utility systems; W. J. Kulp, of Denver, who spoke on fire protection; and C. J. Reading, of Salt Lake City, who spoke on airport lighting.

C. J. Reading, superintendent of fire and police telegraph of Salt Lake City, was elected president of the association for the ensuing year. The next convention is to be held at Jacksonville, Fla.

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JAGGAR-SROUFE HOLDS ANNUAL PICNIC—The Second Annual Picnic of the Jaggar-Sroufe Comany, electrical contracting firm of Portland, was held at Sam Jaggar's country place on the Clackamas River near Portland, July 13. Families and friends of the firm's 60-odd employees attended to the number of about 300. Games and stunts began at 11 o'clock in the morning and continued throughout the day until the late evening.

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REORGANIZED as a chapter of the Association of Electragists, International, the Denver Electrical Contractors' Association, Inc., recently elected the following officers: J. R. Collier, president; C. F. Oehmler, vice-president; George A. Graveline, secretary, and L. A. Vosmer, treasurer. To the board of directors were named: T. Nollenberger, J. R. Collier, C. F. Oehmler, George A. Graveline, L. A. Vosmer, E. E. Stettler, and William A. Guscott.

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BASEBALL FIELD lighting has been develped to its fullest on the Pacific Coast recently since the original installation at Sacramento by Camp & French, contracting engineers of that city. Following this installation the same company installed lighting for the Fresno baseball park. In Oakland, the Scott-Buttner Electric Company of Oakland installed the recently dedicated lighting installation for the Oakland Club. In Portland the Jaggar-Srouffe Electric Company made the installation at the ball park there. In Los Angeles the Wrigley Field installation was made by the English Electric Company.

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Improve Stockton Fair Lighting

Every year at Stockton, Calif., the San Joaquin County Fair and Horse Show is one of the outstanding events of that region. The horse show is looked upon by breeders in California as a testing ground for their thoroughbred stock for entry into the fashionable horse shows of the country.

From year to year the electrical installation at the fair grounds is being improved. This year the Grider Electric Company, of Stockton, added a notable improvement by revamping completely a number of concrete posts turned over to the fair authorities by the state. These posts were equipped with new bases and with Westinghouse tops, making an excellent lighting job around the fair grounds.

A number of special floodlighting banks were also being installed by the Grider Electric Company to light up the various backgrounds for the horse show and the other events of the fair.

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THE NEWLY REORGANIZED San Francisco Electragists, at their meeting early in August elected permanent officers for the ensuing year. Tom Harris, of the H. S. Tittle Company, was elected president. Al Drendell, of the Decker Electrical Construction Company, was elected vice-president. On the executive committee were named Fred Minkle, of Minkle & Lucas, Charles Schmitt, of the Superior Electric Company, and Clyde Chamblin, of the California Electrical Construction Company. Meetings are held on Thursday noons at the States Restaurant.

Electric Smith of the Inland Empire

In Spokane the windows of H. A. Smith's electric store shine out with attractive merchandise displays late into the night, inviting passersby on the way home from the theaters to investigate the comforts which electricity can bring. Mr. Smith also conducts an extensive wiring business in the Inland Empire

Light Oregon Caves

Civilization will have taken another step forward into the wilderness when NePage McKenny Company, electrical contractors of Portland, Ore., completes its contract for lighting the Oregon Caves, well-known tourist attraction in the Siskiyou national forest, Josephine County, Ore. The contract, which was taken for approximately $22,000, includes the installation of a 60-hp. Atlas Imperial Diesel engine with a 45-kw., 2,400-volt, a.c. generator, and suitable transformer and control equipment.

A total of 2,800 ft. of the caves is to be lighted, utilizing about 25 kw. The remainder of the generator capacity will be made available for lighting the surrounding grounds, the hotel and other resort buildings.

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A BILL authorizing the Bureau of Labor to make electrical inspections based upon the last edition of the National Electrical Safety Code, is being proposed to the Oregon Legislature, amending present legislation. The bill proposes the licensing of jonrneymen and helpers and will increase the bond for electrical contractors to $1,000 and the license fee to $25. Labor Commissioner Gram has been holding meetings with contractors and other interested parties to discuss and coordinate the views of the various groups in support of the new legislation.

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THE PALMER ELECTRIC COMPANY, of Modesto, Calif., was the first to wire a miniature golf course in that city. The installation was made on a course 175 x 40 ft. on 8 x 8-in. poles between which were strung messenger cables supporting 24 200-watt R.L.M. porcelain reflectors.

Manufacturer Distributor

TO BUILD PLANT DESTROYED BY FIRE—Reconstruction of the General Illuminating Company's plant at 1530 Westlake North, Seattle, will be started shortly, according to a recent announcement of James R. Lunke, Seattle branch manager of the company. A two-story brick building at that site, formerly occupied by the company and partially destroyed by fire a month ago, is to be completely rebuilt and in addition a 50 x 50-ft. extension will be constructed, providing a total floor space of 12,000 sq.ft. The company manufactures Neon signs and has branches in Aberdeen and Spokane, with service plants in Tacoma and Portland.

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PORTLAND PLANT FOR POWER PLANT ENGINEERING CO.—Power Plant Engineering Company, manufacturer and distributor of oil burners on the Pacific Coast, as a division of the Petroleum Heat & Power Company, New York, is building a new sales, service and warehousing building at East Thirteenth and Burnside Sts., Portland. The building is 50 x 90 ft., of concrete. The company distributes NoKol, Petro and Fess oil burners. S. B. Stauffer is Portland manager; R. S. Whaley of Seattle, who is president of the Power Plant Engineering Company and vice-president of the Petroleum Heat & Power Company, manages the Northwest division.

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CUTLER-HAMMER ACQUIRES REYNOLITE LINE—Effective Aug. 1, the Reynolite Division of the Reynolds Spring Company, Jackson, Mich., became the wholly owned subsidiary of Cutler-Hammer, Inc. This transaction brought into the Cutler-Hammer line the Reynolite products, consisting of Bakelite flush plates, plural plugs, and other devices.

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REPRESENTANG ROYAL ROCHESTER LINE ON COAST—The P. B. Miller Company, with headquarters at 812 Creed Road, Oakland, Calif., has been appointed Pacific Coast representative for the Robeson-Rochester Corporation, of Rochester, N. Y., manufacturer of the Royal Rochester line of electrical appliances. Mr. Miller formerly was Pacific Coast representative of the Simplex Electric Heating Company.

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MOVES SAN FRANCISCO HEADQUARTERS—The Eckert-Lloyd Corporation, manufacturers' representative, has moved its San Francisco headquarters to 770 Mission St. The company's Los Angeles address is 1001 East First St.

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FLETCHER BROTHERS, Victoria, B. C., have been appointed distributors on Vancouver Island by General Motors Corporation for Frigidaire equipment.

KOKOMO TOYS MERGED WITH KINGSTON PRODUCTS—Announncement has been made, effective July 1, of the merger of the Kokomo Stamped Metal Company, Kokomo, Ind., with the Kingston Products Corporation, of that city. In the Kokomo company's line are a number of electrical toys, including juvenile ranges and the "Auto Builder," an electric floor toy. Though the Kingston Products Corporation has had no identity with the toy industry, it has long manufactured electrical specialties, and has recently gone into the design and production of radio equipment. The toys formerly manufactured by the Kokomo company still will be sold under the "KoKoMo" trade name.

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ANACONDA WIRE & CABLE HOLDS SALES MEETING—Pacific Coast salesmen of the Anaconda Wire & Cable Company, New York, and the Anaconda Wire & Cable Company of California held a sales meeting at San Francisco Aug. 7-9. The meeting was in charge of C. Dent Slaughter, Pacific Coast manager of the company with headquarters in San Francisco, and among those in attendance were L. R. Hanlon, manager of the California company's Los Angeles office, and L. M. Wolfe, Seattle manager of the parent company. The meeting was preliminary to a general sales meeting called in New York for Aug. 29 at which all Pacific Coast managers of the company were in attendance.

POWER FACTOR CORRECTION FOR NORTHWEST NEON SIGNS—Acceding to the demands of the Pacific Northwest Public Service Company and the Northwestern Electric Company, Portland, all the manufacturers of Neon signs in the territory served by these two companies have agreed to equip all signs sold with capacitors or other power factor corrective devices to bring the power factor of the signs up to a minimum of 80 per cent. This agreement is effective beginning Sept. 1, and applies to all signs sold by the manufacturers to receive service from the systems of the two companies mentioned.

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GARDINER BROS. HAVE MARION LINE—E. J. A. Gardiner and M. T. Gardiner, comprising the firm of Gardiner Bros., with salesrooms at 1203 East Eighth St., Los Angeles, and 717 Market St., San Francisco, have secured the sales agency in California for the Marion line of electrical appliances manufactured by Rutenber Electric Company, Marion, Ind.

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JOINS OKONITE COMPANY IN LOS ANGELES—Theodore Tomlinson ("Ted") Kennedy, formerly a sales representative in the San Francisco office of the Okonite Company, of Passaic, N. J., has been appointed manager of the company's Los Angeles office. Mr. Kennedy joined the Okonite organization in 1924, and came West to the San Francisco office in 1927.

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Conlon Corporation Believes in Air Travel

ALL OF the thirty and more district managers of the Conlon Corporation, of Cicero, Ill., manufacturers of electric washers and ironers, will take to the air just as soon as they can learn to fly, according to Walter J. Conlon, president of the corporation. First to be equipped with a plane for covering his territory was Lee O. Cox, division manager for Washington, Oregon and Montana, who is shown about to hop off from Chicago for the Northwest recently in his Kinner-powered Waco ship with Thomas Conlon, a son of W. J. Conlon, who is bidding good-by to his father.

Young Mr. Conlon is acting as Mr. Cox's assistant in selling operations in the Northwest states. He is taking flying lessons and when he receives his Department of Commerce credentials will also be fitted out with a ship.

Fred W. Biven, representative of the Conlon Corporation in California, Nevada, and Arizona, is learning to fly, and as soon as he obtains his pilot's license will accept the company's offer of a plane.

REPRESENTS THERMADOR IN NORTHERN CALIFORNIA—Clyde L. Chamblin Company, of San Farncisco, has been appointed northern California representative for the Thermador, an electric room heater manufactured by the Hoffman Specialty Company, Inc., Waterbury, Conn. Pacific Coast sales headquarters of the Hoffman company are at 815 West Fifth St., Los Angeles.

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THE INDUSTRIAL ENGINEERING AND EQUIPMENT CORPORATION, with offices in the Subway Terminal Building, Los Angeles, Calif., has been established by Emmett H. Jones. This company is engaged in the electrical specialty device business, handling distribution in the southern California territory for the W. N. Matthews Corporation and others. Mr. Jones recently disposed of his interests in Jones-Lyman & Company, Inc., and the Utilities Equipment Corporation, San Francisco and Los Angeles.

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A. G. MANUFACTURING COMPANY TO EXPAND—Activities of the A. G. Manfacturing Company, of Seattle, makers of electrical switches and switch boxes, are to be enlarged, according to Governor John H. Trumbull, of Connecticut, a recent visitor to Seattle. Governor Trumbull is president of the Trumbull Electric Manufacturing Company, Plainville, Conn., and vice-president of the A. G. company. A controlling interest in the A. G. company was purchased by the Trumbull company several months ago.

U. S. ELECTRICAL MFG. CO. TO HAVE CHICAGO WAREHOUSE—Factory sales headquarters for the Eastern territory are to be established shortly in Chicago by the U. S. Electrical Manufacturing Company, motor manufacturers of Los Anegeles. Complete warehouse stocks of the company's motors will be carried at the Chicago headquarters, and factory engineers will be in charge of the office to serve territory throughout the East. The company also maintains warehouse stocks in New York City and San Francisco supplementing its factory stocks in Los Angeles.

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REPRESENTING CLARK WATER HEATERS—W. C. Greene, formerly sales manager at Long Beach, Calif., for the Southern California Edison Company, has been placed in charge of sales in southern California by the Clark Electric Water Heater Division of the McGraw Electric Company, Omaha. The Graybar Electric Company has northern California distribution of Clark electric water heaters.

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THE S. A. RAN CO., 828 Webster St., Oakland, Calif., wholesalers of electric supplies, has installed attractive display rooms where contractors may bring their clients to inspect and select fixtures and to obtain the advice of experts in selecting appropriate color combinations, designs and materials for use in homes, apartments, business houses or public buildings. Maurice Taloff is manager.

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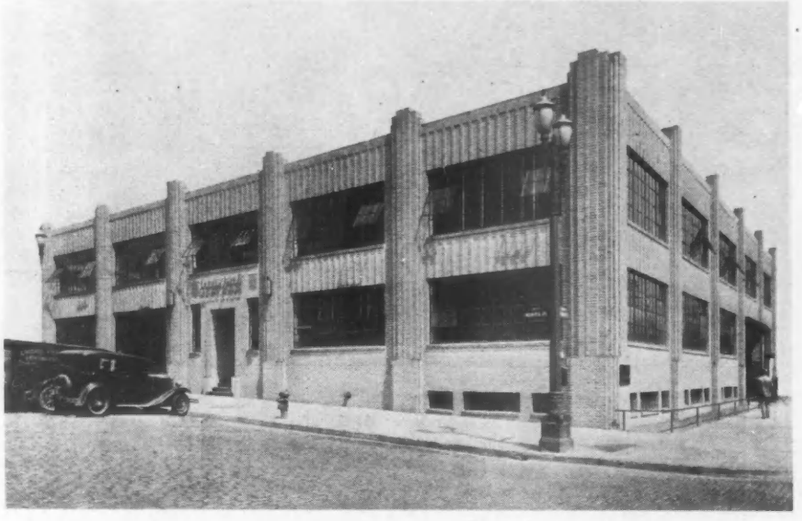
New Seattle Graybar Building



THE new building at King and Occidental Sts., Seattle, which houses the branch of the Graybar Electric Company in that city. Close to railway and boat line terminals and in the center of the wholesale district, the location of the building yet permits of natural light on four sides. The warehouse, service counter and display space make up the first floor, and on the second floor are the general offices, sales and service departments and the conference-display room. Provision has been made for sound correction in all of the offices to eliminate execessive noises from the outside or from within.

For Neon Manufacture

THIS new San Diego factory and office building of the Electrical Products Corporation is attracting considerable attention because of its location on the Los Angeles-San Diego highway at 1702 Kettner Blvd. The factory tower displays four 8-ft. clocks with Claude Neon hour and minute hands in marine green with numerals in orange-red and the entire face outlined in blue. The corporation is importing from Holland some glass bricks which will be installed beneath the clock and illuminated from behind.

The signs, of course, are all of Claude Neon tubing, while the office is equipped with seven Claude Neon chandeliers. A goldfish fountain with blue and green Neon illumination reflected through the water adds a colorful effect to the interior of the building.

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INDUSTRIAL PRODUCTS ADVERTISING ELIGIBLE FOR AWARD—Among the Harvard advertising awards announced for 1930 is a prize of $1,000 for a campaign of industrial products. Winners are announced each year in February, after a jury appointed by the Dean of the Harvard Business School has selected the winning material. Awards are limited to advertising appearing in newspapers and magazines during the current year. A statement of 600 words giving pertinent facts concerning the campaign must accompany each entry.

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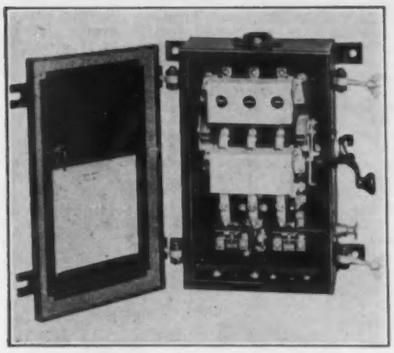
ELABORATE and elegant in its details, the new showroom of the Phoenix Day Company, at 529 Mission St., San Francisco, supplements and replaces the former Thomas Day Company establishment which formerly was next door. The Phoenix Day Company recently acquired the Thomas Day Company and established the new fixture display quarters. Spanish-Moorish architecture was adopted for the new home.

New Products



Dust-Tight A.C. Starters

A new type of dust-tight enclosure for across-the-line and combination starters has been placed on the market by the Industrial Controller Division of The Square D Company, Milwaukee, Wis. The cabinets are of heavy-gage steel with heavy strap-iron mounting brackets. Cast-iron conduit flanges with live-rubber gaskets are furnished on top and on the bottom of the cabinet to insure dust-tight conduit connections. The door has a deep flange for fitting around the cabinet. Inside, the door is fastened by means of metal strips, a heavy felt gasket which is tightly clamped against the wide cabinet flanges by means of hinged bolts.

Two or more straps are provided on the door cover to receive the hinged bolts. The right-hand ends of the straps are slotted to permit the hinged bolts to swing free of the straps. The left-hand ends of the straps are drilled so that the cover swings on the bolts, acting as a door hinge. This is an important feature in that it is not necessary to remove the cover which may become lost or not be replaced.

The cabinets and conduit flanges are enameled and hinge bolts and other exposed metal parts are cadmium plated. For the thermal overload relays a dust-tight push button is furnished in the side of the cabinet for resetting the relays from the outside.—ELECTRICAL WEST, Sept. 1, 1930.

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Reflector Heaters

Two new models have been added by the Majestic Electric Appliance Company, 590 Folsom St., San Francisco, to its line of reflector heaters.

Mogul 75 is of single shell construction with chromium plated reflector surface. This heater is finished in Pompeian green, equipped with an 8-ft. cord plug and 1,000-watt Mogul-type element.

Majestic 72 reflector heater has a copper plated reflector and 660-watt screw-in element. It is finished in Nile green, and has an 8-ft. cord and plug attached.—ELECTRICAL WEST, Sept. 1, 1930.

Duplex Flush Receptacle

A brown Bakelite body, bosses with easy-to-find ribs, and plaster ears integral with the yoke are features of a new duplex flush receptacle of only 23/32 in. depth, recently announced by The Bryant Electric Company, Bridgeport, Conn.

Two extra large binding screws provided in each side wiring terminal make of this receptacle a connecting block as well as a convenience outlet. List price of the Catalog No. 4832 receptacle is 50 cents.—ELECTRICAL WEST, Sept. 1, 1930.

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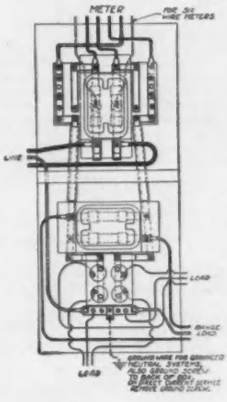
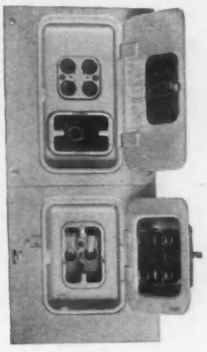
Meter Test Switch and Distribution Panel

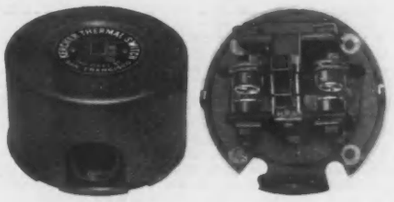
To meet a growing demand for a combined main service meter test switch and branch distribution panel to take care of range and lighting circuits, the Bull Dog



Electric Products Company, of Detroit, has designed in one cabinet a 60-amp. externally operated meter test entrance switch and a branch distribution panel consisting of a 60-amp. fuse (permitting a 40-amp. fusible circuit for range or other device) and four or six 30-amp. fusible circuits for lights, hot water heater, or other appliance. It is only necessary for the contractor to attach the line and load wires to their respective terminals as the main switch is connected to the branch circuits by suitabe buses. Flexible meter loops with lugs soldered in also are provided.

Compactness, convenience, ease of wiring and ornamental appearance are claimed for these new products by the manufacturer.—ELECTRICAL WEST, Sept. 1, 1930.





Combined Automatic and Manual Control Switch

A new device recently brought out by Wesix Inc., 390 First St., San Francisco, eliminates the necessity for a separate switch for manual control on automatic electric water heaters. The device consists of a standard double-pole Kercher thermal switch which controls the temperature of the water automatically, with a tumbler switch arrangement that may be operated manually. Contacts are of extra-heavy, commercially pure silver capable of breaking 40 amp., and through the snap action of the Kercher pressure cell the circuit is broken with a quick and positive action, according to the manufacturer. The tumbler arrangement likewise effects a quick make and break when manually operated.

The combination thermostat and switch is standard equipment on all Wesix water heaters, and the unit is available to manufacturers of heaters of other makes.—ELECTRICAL WEST, Sept. 1, 1930.

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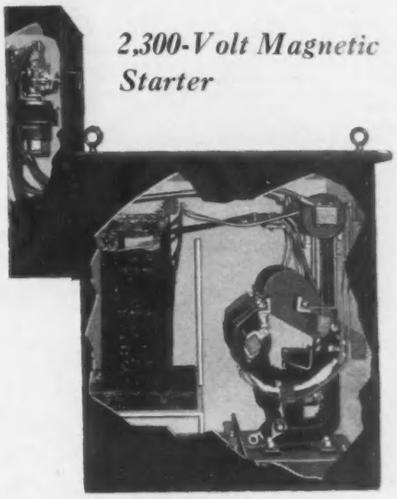
2,300-Volt Magnetic Starter



A 2,300-volt, full voltage magnetic starter, intended for across-the-line starting of squirrel cage and synchronous motors, and to control the primary of slipring motors, is announced by The Electric Controller & Manufacturing Company, Cleveland, Ohio. The starter is built for reversing, non-reversing and plugging applications. There are no bell cranks, toggle mechanisms or lever systems between the magnet armature and movable contact arm. The magnet armature is direct acting and is supported by one large bearing pin, and the entire unit is totally oil-immersed.

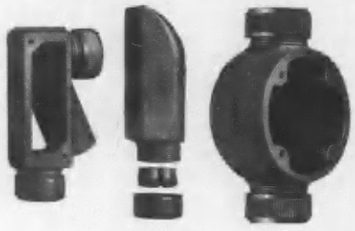
Duplicate contacts, easily renewable, open and close the circuit with a wiping and rolling action. The enclosing case is a heavy welded steel tank, which houses the completely wired unit. A longer tank containing two magnetic contactors, mounted back to back and mechanically interlocked, is supplied for reversing, non-reversing and plugging applications.

It is not necessary to build an expensive control room for these starters. Frequently it may prove economical to mount them out in the plant alongside the motors they control, thereby permitting a substantial saving in installation costs. All live parts are totally enclosed, and grounding the case provides shockproof installation. The starters are available in two sizes with maximum ratings of 600 hp. and 1,200 hp. respectively.—ELECTRICAL WEST, Sept. 1, 1930.

Adapti Rectangular Threadless Fittings

A line of rectangular, threadless standard rigid conduit fittings is being manufactured by the Adapti Company, 2996 East 72nd St., Cleveland, Ohio. The line comprises the usual ells, end fittings, a corresponding line of switch boxes of the round and rectangular "gang-switch" types, and threadless couplings and connectors.

The fittings are made in sizes up to and including 1 in., and are so designed that they will take the same covers, receptacles and wiring devices as the corresponding threaded types. This, combined with the fact that the body dimensions are the same, makes these threadless fittings easy to install wherever changes, extensions or difficult work is to be carried on .—ELECTRICAL WEST, Sept. 1, 1930.



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Belt Drive

Consisting of a number of endless molded rubberized-cord belts, running in grooved sheaves, the "Multi-V-Drive," recently placed on the market by the Worthington Pump and Machinery Corporation, Harrison, N. J., provides a durable and simple means of power transmission, impervious to dust and moisture. The grooves present a smooth surface on which the belts run, and the wedging action between the belts and the grooves results in a slipless, powerful grip which compensates for, but differs from, initial belt tension in a flat belt drive, and results in an effective conformity of belt to sheave which, according to the manufacturer, assures maximum power transmission efficiency.—ELECTRICAL WEST, Aug. 1, 1930.

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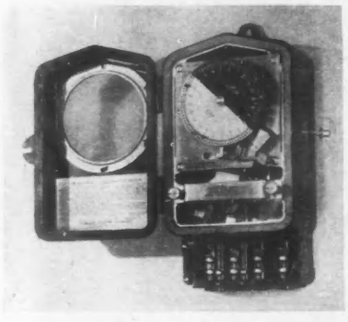
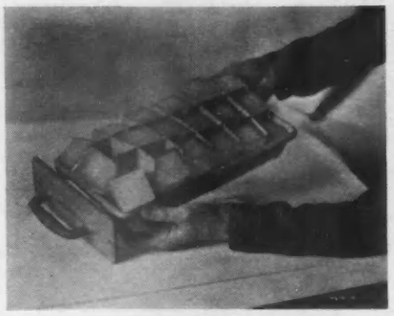


Time Switch

In an electrically wound time switch with meter type base designed to fit standard meter boxes, developed by the Sangamo Electric Company, Springfield, Ill., the reserve power in the mainspring is sufficient to operate the time and switching mechanism through current interruptions up to 18 or 20 hours if only two switching operations are necessary. Since the induction motor serves merely to wind the mainspring, the instrument is entirely independent of voltage or frequency variations on a.c. circuits.

All working parts of the switch are readily accessible. The mercury tube can be removed from the front by unscrewing two knurled nuts holding the tube supporting bracket in position. After removing the tube the clock mechanism proper, mounted on a substantial bracket, can be removed from the front by taking out four screws.—ELECTRICAL WEST, Sept. 1, 1930.



Ice Cube Tray

A new ice cube tray which simplifies the operation of removing cubes and releases one or a trayful with a flip of the fingers is the latest electric refrigerator improvement of the Frigidaire Corporation, Dayton, Ohio.

The new tray, known as the Quickube tray, makes it possible to obtain a few cubes from the refrigerator without removing the tray from the freezing compartment, and without dislodging all cubes.

Several cubes may be released by pulling the tray far enough from the freezing chamber to expose the number desired and pressing downward slightly on the handle. The ice is freed immediately and may be removed with either fingers or tongs. All cubes may be ejected by the simple operation of turning the semi-flexible tray inside out.

The new device is of a semi-rigid material which does not stick in the freezing compartment and slides readily, according to the manufacturer. It contains a steel rod which forms handle and frame, making it durable and easy to handle. Split grids provide for the self-leveling of water upon filling and the tray has rounded corners to make it easy to clean.—ELECTRICAL WEST, Sept. 1, 1930.

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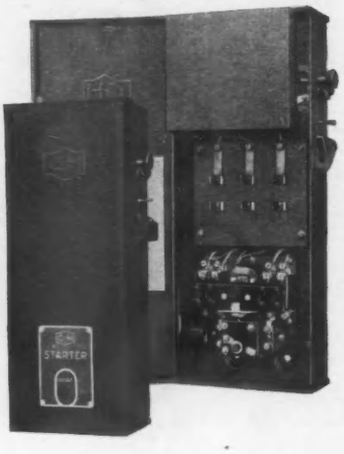
A.C. Motor Starter

Cutler-Hammer, Inc., 153 Twelfth St., Milwaukee, Wis., announces the development of an a.c., across-the-line, automatic starter combined with a fusible disconnect switch in a single steel enclosing case. This new starter may be used in place of a separate starter and fusible disconnect switch.

A feature of the starter is a wiring channel between the starter panel and the back of the enclosing case which allows running the connecting wires behind the panel, where they cannot interfere with the operation of the starter. Ample room is provided to bring all of the connecting wires in at either the top or the bottom of the case, according to installation requirements. All parts are mounted on a back plate which is easily removed for pulling and placing of line and motor wiring—ELECTRICAL WEST, Sept. 1, 1930.

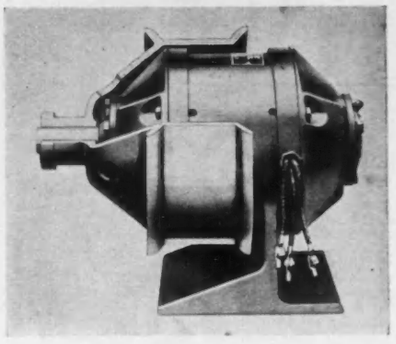


Motors for Runout Tables

Special motors for runout tables in steel and tube mills and for other conveyor work are being built by the Reliance Electric & Engineering Company, Cleveland, Ohio.

These motors are each provided with a single heavy welded-steel support so placed that a pulley-type roller keyed to the motor shaft can rotate around the body of the motor. Various shaped rollers to suit the material to be conveyed can be used. The motors with rollers are lined up in tandem, the distance between being governed by the material conveyed. An installation may require any number of units depending on the distance of travel and the roller spacing.

The motors are fully enclosed so they are protected from all injurious elements. They are provided with class B insulation (asbestos and mica) which will withstand extremely high temperatures. Large ball bearings carry the motor rotor and load with an ample margin of safety, according to the manufacturer.—ELECTRICAL WEST, Sept. 1, 1930.



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Field Lighting Hanger

Developed especially for the supporting of reflectors and service wires over tennis courts, golf courses, bowling greens, and other outdoor fields, No. 77 "Hi-lite" hanger equipment manufactured by Mayo D. Kimball, 814 East Orange Grove Ave., Pasadena, Calif., may be suspended from a messenger wire by means of the cable clamp. To balance the load and allow longer runs, the hanger is supplied with three insulators to carry 110-220-volt, 3-wire service.

The reflector screws on the ½-in. pipe on the bottom plate. This plate in turn screws on the hanger and thus forms a weatherproof housing. Wiring and assembly of hanger and reflector may be done before going out on the job. A No. 78 "Hi-lite" spacer is used between each two hangers to maintain the service wires in lines. On the job, hangers, spacers, reflectors, service wires, lamps and all may be assembled to the messenger wire while it is on the ground. It may then be raised in place as a complete unit, thus eliminating overhead work. The equipment is made of malleable iron plated with Udylite.—ELECTRICAL WEST, Sept. 1, 1930.

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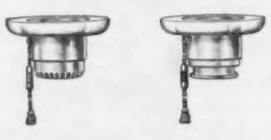
Porcelain Receptacles

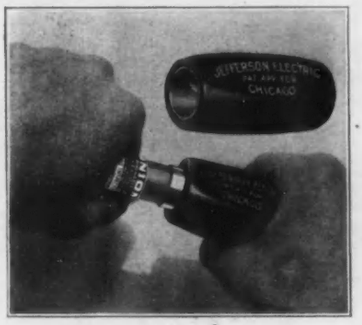


A new line of 4-in. two-piece porcelain pull receptacles for either ceiling or wall installation is announced by the Arrow Electric Division of the Arrow-Hart and Hegeman Electric Company, Hartford, Conn. Six combinations embodying chains, cords, insulators, shareholder rings and other variations comprise the line. The rating of the receptacles is 250 watts, 250 volts, but any of them can be supplied with 660-watt mechanisms at a slight added cost, according to the manufacturer.—ELECTRICAL WEST, Sept. 1, 1930.

Fuse Wrench

A fuse wrench recently placed on the market by the Jefferson Electric Company, 1500 South Laflin St., Chicago, consists of a comfortably-sized hard wood handle with a hole in each end, both of which holes contain a hardened strip for engaging the slot in the fuse cap or plug. For tightening or loosening the cap on a fuse, it is only necessary to insert one end of the fuse into the wrench and turn. The fuse fits snugly into this hole and the strip is held squarely into the slot which enables greater leverage and makes for a tighter connection, or for ease on loosening the cap even though it is securely fastened.

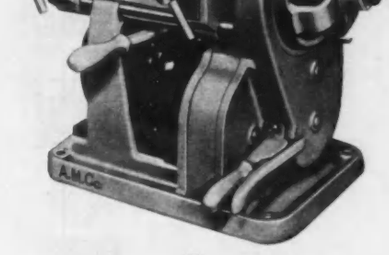
Fuses of the 250-volt, 1-30-amp. size are provided for in one end and 250-volt 35-60-amp., and 600-volt, 1-30-amp. in the other. Price of the wrench, if bought from an electrical wholesaler, is 30 cents.—ELECTRICAL WEST, Sept. 1, 1930.



Pipe-Threading Machine

In a pipe-threading machine recently developed by the Axelson Manufacturing Company, Ltd., Los Angeles, the pipe that is to be threaded remains stationary, while the standard square die is revolved, cutting the thread. Since it is unnecessary to rotate the units, long strands of assembled pipe or bent pipe may be conveniently threaded.

The threader will cut at the rate of 17 revolutions a minute on all sizes from ⅛ in. to 2 in., according to the manufacturer, and the required time for completing eleven threads is about 40 seconds. Attachments available for the cutter head permit cutting off, reaming and bolt making.—ELECTRICAL WEST, Sept. 1, 1930.



Radio Interference Test Set

A radio interference trouble finder for use by power companies has been added to its line of such equipment by Hallock-Watson & Yonge, 191 Park St., Portland, Ore. The dimensions of the set, which is known as "Trouble Finder-6," are 5½ x 10½ x 17 in., and it weighs 23 lb. complete. The instrument consists of a loop operated radio receiver calibrated for audibility measurements by headphones or separate audibility meter. A more elaborate eight-tube model also is made which incorporates a loud speaker and visual volume indicator. —ELECTRICAL WEST, July 1, 1930.

Armored Cable Box

"Kompact" armored cable box No. 2768, manufactured by the American Circular Loom Company, Inc., 233 Broadway, New York, has an abundance of room for splices, avoiding injury to the wires by hickeys and insulating joists. Four cables can be entered in the bottom knockouts, or in side knockouts, or two in each position. Screws operating wedge type clamps have large fillister heads with wide slots, and do not project through the bottom of the box. The bottom is flat and unobstructed and can be mounted on any surface.

Knockouts can be removed either before or after the box is installed, as screw driver slot "pry-outs" make their removal easy. Carefully arranged nail holes permit mounting on any kind of support.—ELECTRICAL WEST, July 1, 1930.

Trade Literature

¶ INDUSTRIAL LIGHTING—"The Way Out of the Twilight Zone," a recent joint publication of the Westinghouse Lamp Company and the Westinghouse Electric and Manufactuaring Company, points out the path from "that deceptive half light between obvious darkness and adequate illumination" to that degree of lighting which enables maximum operation efficiency in factory and office. Descriptions of various types of lighting equipment and instructions for designing good systems of interior lighting are presented. Tables showing present standards of foot-candle illumination for commercial and industrial interiors, room and maintenance conditions to be considered, and outlet spacing and lamp size for commercial interiors are included.

¶ G. E. PUBLICATIONS—Recent publications released by the General Electric Company, Schenectady, N. Y., include the following:

GEA-982B: Airport Illumination.
GEA-1151A: Mercury-Arc Rectifiers for Railway Service.
GEA-722B: Selsyns for Remote Signaling, Control and Indication.
GEA-544A: General Electric Dynamometers.
GEA-192F: G-E Portable Farm Motor.
GEA-1248: A.C. Network Equipment.
GEA-1266: CR7505 - A1 Photo - Electric Relay.

¶ ELECTRIC HEATERS—Both wall and table-type models of the Thermador, a room heater employing the principle of horizontal fan circulation of warm air, manufactured by the Hoffman Specialty Company, Inc., Waterbury, Conn., are described in a comprehensive booklet entitled "A Seven-League Step in the Science of Heating." Copies of the booklet may be obtained by addressing the Los Angeles headquarters of the Hoffman company at 815 West Fifth St., where sales efforts in the eleven Western states are concentrated.

¶ BRIGHTLY COLORED MOTORS—"Color to Lengthen Motor Life" is the subject of a mailing piece recently prepared for distribution by The Reliance Electric & Engineering Company, 1042 Ivanhoe Road, Cleveland, Ohio. The practice of the Reliance company of coating d.c. motor windings with a bright orange-colored enamel so that dirt may be detected easily by maintenance men is described.

¶ BATTERY CHARGERS—"Rectigon Battery Chargers" is the title of leaflet No. 20478, recently published by the Westinghouse Electric & Manufacturing Company. The leaflet includes construction and application details of these chargers, including a table showing the cost of operation, and diagrams showing methods of connecting the batteries to the chargers.

¶ GANG-OPERATED SWITCHES AND CONDUCTOR FITTINGS—Two recent bulletins of the Delta-Star Electric Company, 2400 Block Fulton St., Chicago, describe respectively the company's standardized outdoor high-tension "Unit Type" vertical-break "MA-39" gang-operated switches, and clamp type busbar and conductor fittings type "F."

¶ "THE PHOTOLYTIC CELL"—A 34-page booklet of this title, whose expressed purpose is "to present to the experimental pioneers a fundamental working knowledge of photo-electricity, to dispel the apparent mystery surrounding it, and to place in the hands of the progressive and alert the practical tools with which to construct several simple working models," has been published by the Photo-Electric Division of the Arcturus Radio Tube Company, Newark, N. J. A price of 25 cents is being charged for the booklet, but copies are offered gratis by the publisher to readers of this announcement.

¶ BOX CAR LOADER—Two illustrated data sheets, giving descriptions and specifications of a new heavy-duty box car loader and a standard loader that has been on the market for some time, have just been published by the Stephens-Adamson Manufacturing Company, Aurora, Ill. A new use featured for these portable loaders is for throwing bulk materials far enough to distribute cargo in the holds of freight boats.

¶ RESISTANCE UNITS—High resistance units, normal wattage ratings, and wattage rating restrictions are among the subjects covered in a 16-page reference catalog recently published by the Ohmite Manufacturing Company, 636 North Albany Ave., Chicago. Temperature rise curves for both open and enclosed mountings, and a series of wattage curve charts together with pertinent formulas and engineering data are included in the catalog.

¶ ELECTRICITY ON THE FARM—Illustrated description of electric appliances and apparatus manufactured by the General Elctric and its associated companies, and suitable for farm use, is given in a pocket-size booklet recently issued by the General Electric Company, Schenectady, N. Y. Prices of the appliances listed are given.

¶ SWITCHBOARDS AND PANEL BOARDS—Type F.F. and type Q.M dead-front switchboards, type R.F. dead-front-live-rear switchboards, Controlite stage boards, type S. switchboards, and Bakelite panel boards manufactured by Mullenbach Electrical Manufacturing Company, 116 East Sixteenth St., Los Angeles, are illustrated and described in the company's recently issued Bulletin No. S30, copies of which may be obtained upon request.

¶ FUSE CUTOUTS—Bulletin No. 508 issued recently by the W. N. Matthews Corporation, St. Louis, Mo., illustrates and describes a new line of wet process porcelain housed Matthews cutouts and disconnecting switches. New data on Matthews guy anchors are contained in another recent bulletin, designated as No. 803.

¶ ARC WELDING—"Automatic Arc Welding by the Electronic Tornado Process" is the title of a 40-page booklet recently published by The Lincoln Electric Company, Cleveland, Ohio. The booklet describes the process of automatic welding with the carbon arc., comparing it with other welding processes.

¶ ELECTRICAL SHEET STEEL GRADES—Information regarding a revision of grade names for the electrical sheet steel grades manufactured by The American Rolling Mill Company, Middletown, Ohio, is given in a recently published booklet of that company entitled, "Armco Electrical Sheet Steel Grades."

¶ WIRING DEVICES CATALOG—Catalog No. 30 of The Bryant Electric Company, Bridgeport, Conn., manufacturer of electric wiring devices, is being distributed. Complete information concerning the several thousand items listed is given in this 152-page catalog.

¶ EXTENSION CABLE CONNECTORS—Bulletin No. 2215 of the Crouse-Hinds Company, Syracuse, N. Y., gives description and prices of the company's Arktite extension cable connectors for portable apparatus taking large current.

¶ "ELECTROCHEF NEWS" is a new publication that is to be issued periodically by Electromaster Inc., Detroit, and devoted to the interests of the Electrochef cooking machine.

¶ REMOTE MANUAL CONTROL—The de Florez system of remote manual control, operating through an application of Selsyn motors, is described and discussed in Bulletin No. 7520, recently issued by The Brown Instrument Company, Philadelphia.

Barometer

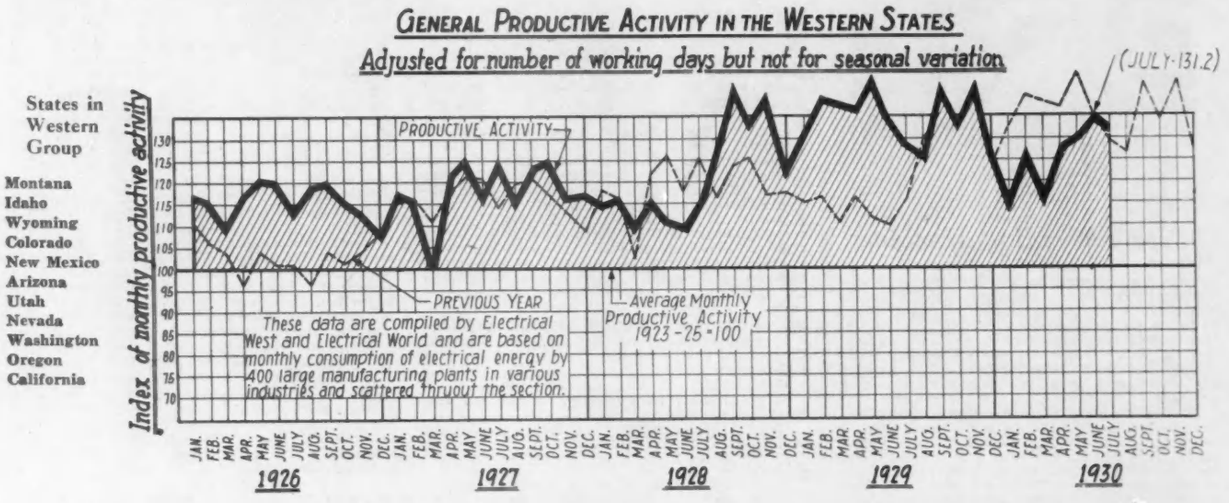
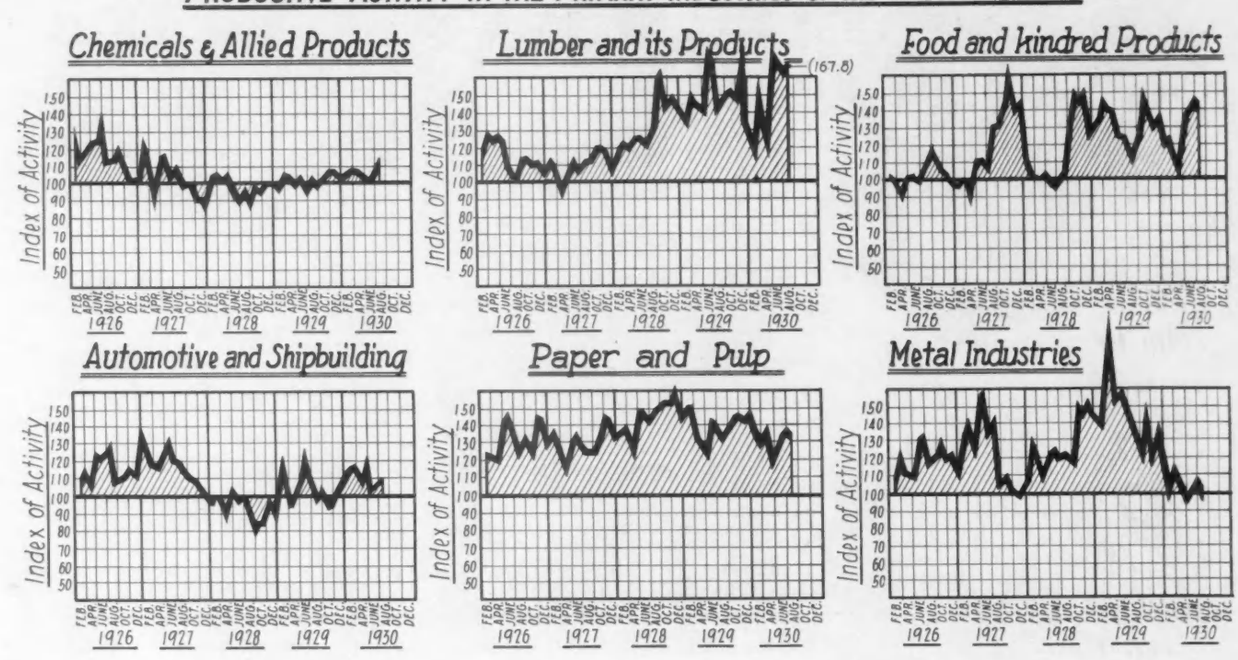
JULY figures for industrial activity in the West are decidedly better than those for the country as a whole. This is the conclusion to be drawn from returns on electrical energy consumption for power purposes in some 400 establishments in this part of the country, which show greater activity by 1.5 per cent than in July, 1929, whereas there was a decrease for the United States as a whole. The average for the first seven months of 1930 continues in excess of that for each year except 1929; it overshoots that of 1928 by 10 per cent.

June was the first month this year showing greater industrial activity than the corresponding month of 1929. This condition continued through July.

As to the individual industrial groups no uniform trend appears. Some show gains, others have fallen off.

Activity in forest products rose 13 per cent compared with July, 1929, and 2 per cent compared with June, 1930; for chemicals and allied products the gains were, correspondingly, 10 and 5 per cent; food products were 17 per cent higher than last year. The metals group has been consistently low since the beginning of the year but the July figures surpass those of January and April. Paper and pulp was 6 per cent below the level of June, but only 2 per cent below the average for the first half year. The figures for rubber and its products are lower than for any preceding month this year, but up to the level of August, 1929, and well above those for the last two months of 1929.

Indexes of Industrial Activity in the Western States

(All figures adjusted for number of working days)

	July 1930	June 1930	July 1929	Average 1st 7 mos. 1930	Average 1st 7 mos. 1929
All industry	131.2	135.0	129.4	127.0	136.6
Chemical and allied products	114.2	109.7	104.4	108.7	97.9
Food and kindred products	139.2	147.5	118.8	132.9	133.7
Forest products	167.8	164.5	148.0	156.0	154.5
Metals group	96.8	108.5	135.0	103.1	156.9
Paper and pulp	130.7	138.5	134.0	134.0	141.6
Rubber and its products	154.0	168.0	179.7	167.9	196.2
Shipbuilding	109.8	109.3	95.0	121.6	105.9
Stone, clay and glass	104.9	113.8	149.2	101.4	141.9